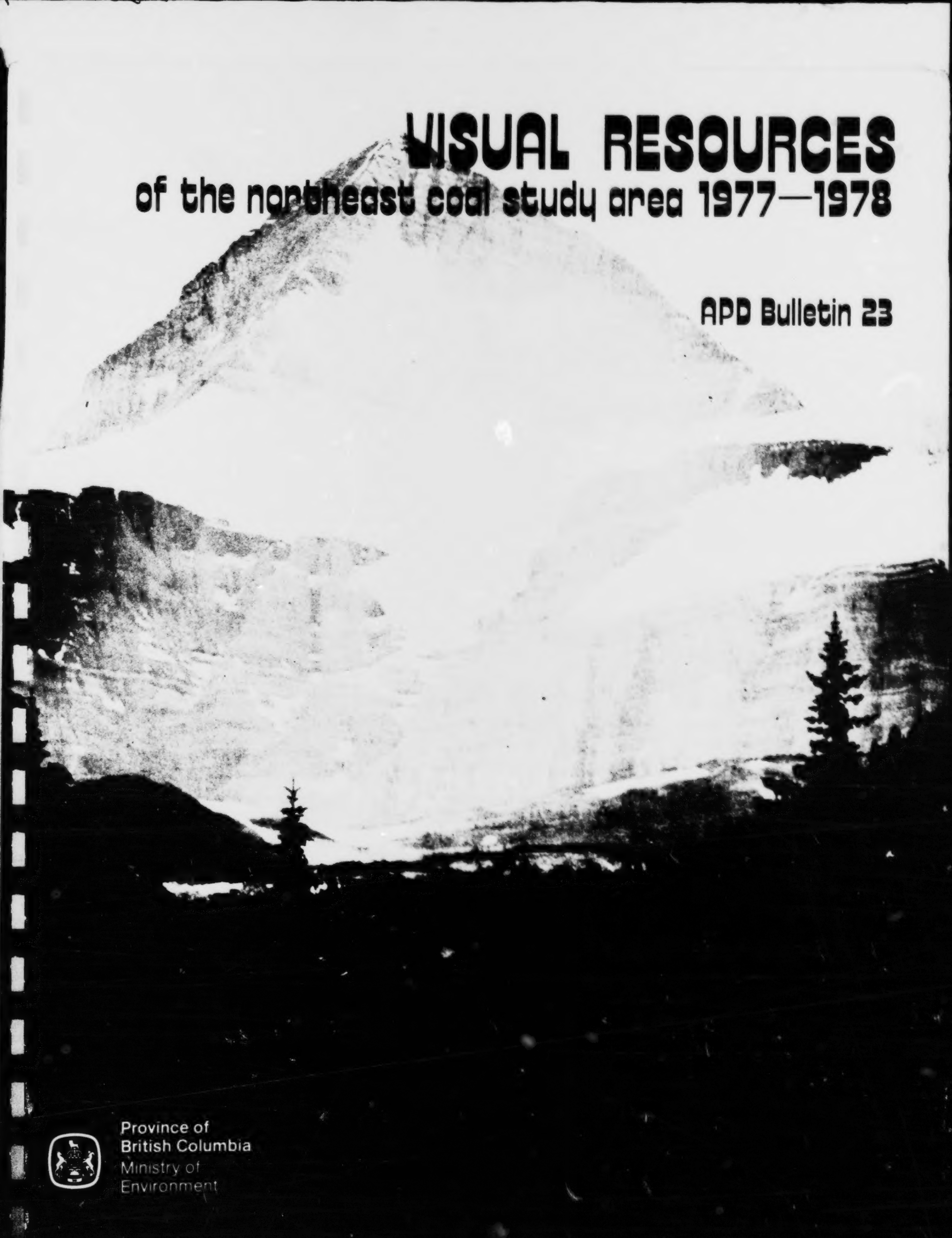

VISUAL RESOURCES
of the northeast coal study area 1977—1978

APD Bulletin 23

Province of
British Columbia
Ministry of
Environment

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COVER PHOTO:

The astonishing majesty and powerful imagery of Mount Sir Alexander, seen from McGregor Pass to the east.

THIS REPORT HAS BEEN PREPARED FOR THE NORTHEAST COAL STUDY AND IS BASED ON PROGRAMS WHICH HAVE BEEN JOINTLY FUNDED BY THE MINISTRY OF INDUSTRY AND SMALL BUSINESS DEVELOPMENT (PROVINCE OF BRITISH COLUMBIA) AND THE DEPARTMENT OF REGIONAL ECONOMIC EXPANSION (CANADA).

Province of British Columbia
Ministry of Environment
ASSESSMENT AND PLANNING DIVISION

APD Bulletin 23

VISUAL RESOURCES OF THE NORTHEAST COAL STUDY AREA
1977-1978

a technical supplement to the
Northeast Coal Study
Preliminary Environmental Report
1977-1978

prepared for
The Environment and Land Use Sub-Committee
on Northeast Coal Development

by Roger Horner
RESOURCE ANALYSIS BRANCH

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TERRESTRIAL STUDIES BRANCH

**Province of
British Columbia**

Ministry of
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April 18, 1982

Mr. Raymond L. Crook,
Chairman, Environment and
Land Use Subcommittee on
Northeast Coal Development,
c/o Inspection & Engineering Division,
Ministry of Energy, Mines and
Petroleum Resources,
Legislative Buildings,
Victoria, British Columbia.

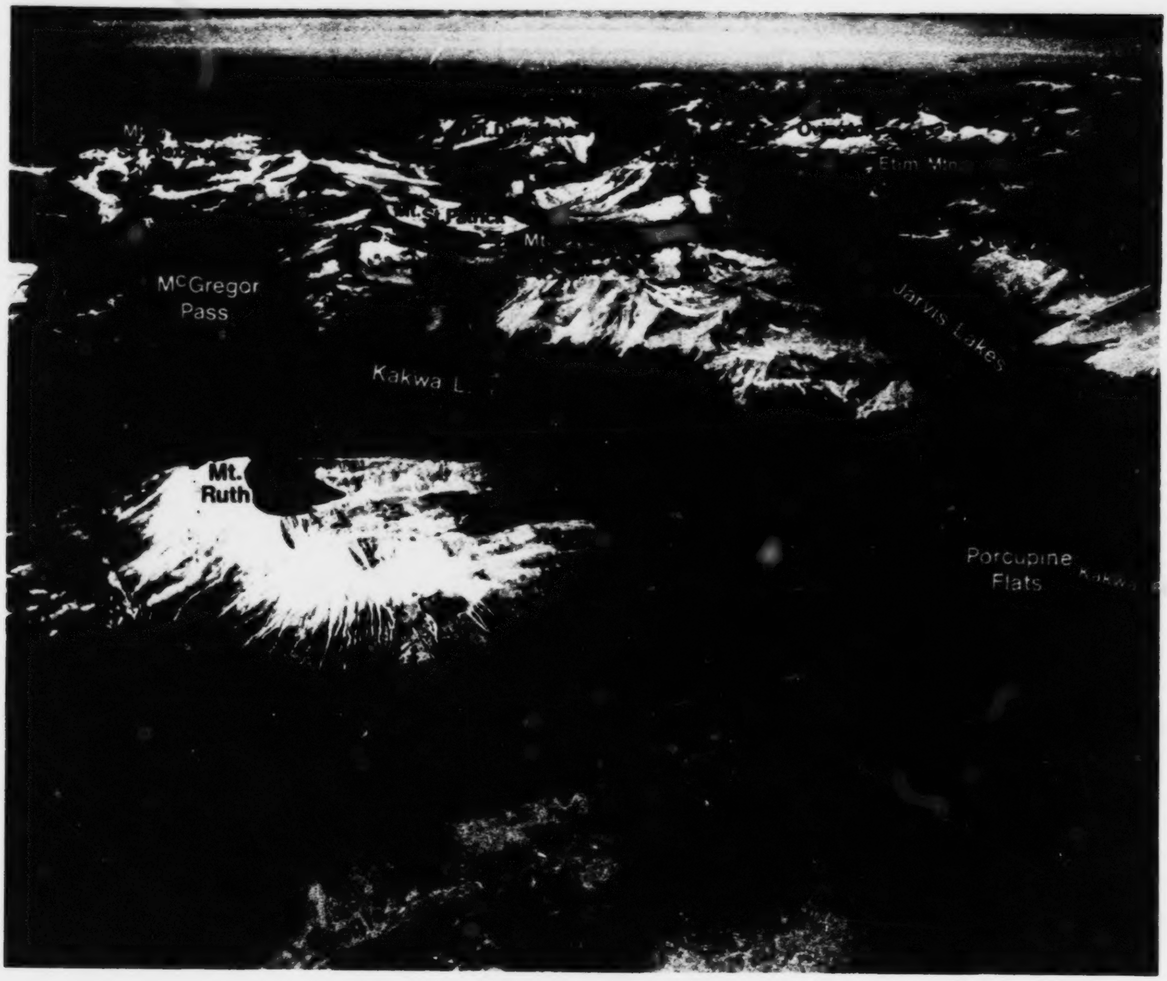
Dear Sir:

I hereby submit to you the report entitled "Visual Resources of the Northeast Coal Study Area, 1977-1978", which has been prepared by my staff for the Northeast Coal Study.

This report fulfills the Terrestrial Studies Branch's commitments respecting the Northeast Coal Study visual resources program.

Sincerely,

P.N. Sprout,
Acting Director,
Terrestrial Studies Branch.



Mt.
McGregor
Pass
Kakwa L.
Mt.
Etim Mine
Jarvis Lakes
Mt.
Ruth
Porcupine
Flats
Kakwa

FRONTISPIECE

This aerial view, looking west from the provincial boundary, illustrates the impressive scenic landscapes of the Park and Hart Ranges. The alpine scenery along the Continental Divide in this area offers the most dramatic views within the Southeast Extension, and has been favourably compared to renowned sites in Banff and Jasper National Parks.

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Note:

The text of this report was essentially finalized during 1979. Since that time, some reorganization of government ministries has occurred. In particular, the staff of the original Resource Analysis Branch has been transferred to three new branches of the Assessment and Planning Division: the Terrestrial Studies Branch, the Aquatic Studies Branch, and the Air Studies Branch. This change is noted at most points in the text where the Resource Analysis Branch is mentioned.

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EXECUTIVE SUMMARY

INTRODUCTION

"Visual analysis" is a relatively new component of resource management studies. Its introduction into planning projects reflects the growing consensus that the human experience of the landscape should be an important and integral consideration in regional resource management efforts.

Traditionally, planning issues have been evaluated and resolved on the basis of economic, engineering, transportation, political, land use/ownership and ecological criteria, but without reference to aesthetic criteria. Usually, the aesthetic sense of the broader-scale environmental setting is overlooked. The characteristics which generate a landscape's sensory quality are not adequately defined, and are seldom considered systematically during planning processes and impact assessments. Access routes, which are of particular concern in this report, are normally designed solely to serve the needs of the initiating resource user, with additional access routes being developed in a similar 'ad hoc' fashion as new needs arise, and with little evidence that the overall multi-purpose transportation needs of areas have been properly assessed. As a result of this approach to development, aesthetically pleasing landscape patterns and features are often disfigured. Ultimately, the personal experience of the landscape may be obscured, and man-made alterations may dominate, a result which is generally undesirable.

With the establishment of the Environment and Land Use Sub-committee on Northeast Coal Development in 1976, a commitment was made to pursue an integrated approach to resource management in the Northeast Coal Block of British Columbia. Visual analysis was included within the resource analysis process in order to ensure that an appreciation of the visual character and quality of the landscape would be incorporated into an overall framework for resource management at both the regional and site-specific scales.

The present visual analysis has had three primary objectives. The first was to evaluate the likely visual impacts of the potential road and rail route and townsite development alternatives which are being considered for the infrastructural support of future coal development within the

Study Area. The second was to provide "visual quality"[1] and "visual vulnerability" interpretations for general resource management purposes. The third was to develop a methodology which can be used by both government agencies and private interests in the visual analysis of future large-scale resource developments[2].

METHODOLOGY

The methodology which was developed for the visual analysis of the 1977-1978 Study Area utilizes, and is a direct outgrowth of, the methodology developed for the analysis of the 1976-1977 Study Area by Tetlow and Sheppard (1977). In the latter study, the "visual unit" concept[3] was developed as a framework for evaluations of both visual quality and visual vulnerability. The visual unit concept has again been applied in the analysis of the 1977-1978 Study Area. In addition, interpretations have also been generated for three types of biophysical units which are currently being mapped by the Terrestrial Studies Branch (in place of the former Resource Analysis Branch), these being physiographic regions, forest zones and terrain units.

The primary purpose of visual unit analysis is to rank the visual quality of the landscape within each visual unit. Visual vulnerability evaluations are also undertaken to determine the relative vulnerability of land surfaces to visual impacts associated with specific developments and related activities. For this report, the evaluation of the proposed corridor and townsite alternatives within the Study Area is based upon both visual quality evaluations and visual vulnerability analysis . In general, the scale of analysis for visual unit interpretations is intermediate between those for the regional-scale physiographic region and forest zone interpretations and the local-scale terrain unit interpretations.

The visual interpretations for each of the three types of biophysical units complement not only each other but also the visual unit interpretations (in terms of both scale and content).

---

[1] The method for evaluating visual quality is discussed in sections 2.2. and 2.3. of Chapter Two.

[2] Analysis of visual resources is now required under the Guidelines for Linear Development (E.L.U.C., 1977). However, resource management consultants and other government agencies in British Columbia have had little experience with visual analysis techniques. To meet this need, the former Resource Analysis Branch recently conducted research designed to develop such techniques (see, in particular, Yeomans, 1977b, 1979). It is recommended that the Province of British Columbia continue to sponsor such research in the future.

[3] The visual unit concept is outlined in section 2.3. of Chapter Two.

Physiographic regions are defined by recognizing the major physical and geological variations in the regional landscape. A system of such regions provides a broad and obvious framework for the development and integration of regional-scale visual management programs by the various public agencies and private developers which are active in a particular region. Specifically, this organizational framework is useful in the discussion of broad development policies and in the preparation of visual management guidelines for an area. The forest zone regionalization is based upon a recognition of regional-scale variations in vegetation criteria such as species composition, gross vegetation patterns, seasonal colours, regeneration potential and stage of vegetation succession. This type of regional breakdown is proving to be especially useful in determining both landscape enhancement potential and site-specific impact mitigation opportunities, since vegetation plays a crucial role in the visual appearance of sites affected by man's activities. The terrain unit interpretations make it possible to highlight visual management problems and opportunities which are directly related to engineering considerations at a relatively local scale.

Collectively, the visual unit and biophysical interpretations constitute a hierarchical description and evaluation of the visual resources of the Study Area, progressing from a regional scale to a more site-specific level.

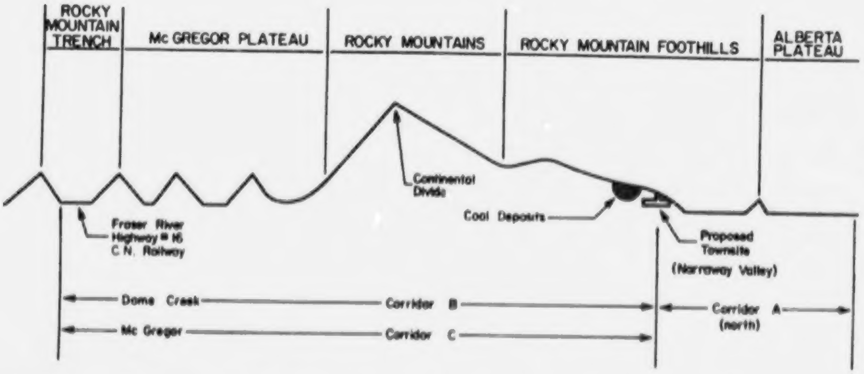
It is recommended here that, where large-scale resource developments are being contemplated, as in the Northeast Coal Block, the major implementation level for visual management programs be the visual unit level. For this reason, the information which has been assembled in this report for the biophysical, visual quality and visual vulnerability interpretations has been keyed to each visual unit in order to facilitate data retrieval on a unit-by-unit basis (see Chapter Six).

In summary, the major departure from the approach of Tetlow and Sheppard (1977) in the present report is that an attempt has been made to integrate the visual analysis with the terrain unit and vegetation unit mapping of the Northeast Coal Study terrain and vegetation teams. The advantage of this approach is that visual management strategies can then become more consistent with the ecological capabilities of the land. Moreover, information is presented which can be used in the design, construction and maintenance phases of project development as well as in the preliminary planning phase. Visual mapping is also greatly simplified since the interpretations are keyed to discrete areas which have been mapped by other resource sectors.

This report constitutes the first attempt by the Resource Analysis Branch (now reorganized as part of the Assessment and Planning Division) to key visual interpretations to biophysical units. The attempt should promote discussion between landscape architects, earth scientists and resource managers involved in the visual management of the landscape, in addition to providing site-specific information relevant to the Northeast Coal Block. It must be stressed that the methodology has not yet been thoroughly tested through application.

SUMMARY DESCRIPTION OF THE STUDY AREA

The Study Area is comprised of five physiographic regions. The cross-section below, which is keyed to Figure 3.1. in the text, illustrates both the structure and location of each region.



Generally, the areas with the highest visual quality ratings are located within the Rocky Mountains region, where immense mountain valleys, dramatic icefalls and glaciers, imposing mountains, turquoise lakes, distinctive avalanche patterns, and attractive waterfalls combine in a varied array of spectacular scenic landscapes. Within this region, the Jarvis, Kakwa, Cecilia and Ovington visual units were assigned "outstanding" visual quality ratings[4]. The scenery within the visual units which are grouped along the Rocky Mountains Divide is comparable to that found in Banff and Jasper National Parks, and recreational reserves have been proposed for several areas within these units (K. Sky, 1979). The landscapes within the Rocky Mountains region also have the highest visual vulnerability ratings. This is due to the high potential visibility and incongruity of horizontal alignments on steeply-sloping land surfaces which are dissected by vertical avalanche chutes.

---

[4] Visual units have been evaluated and given numerical ratings which are termed visual quality ranking scores. These range from zero to 200. In order to simplify the interpretation of these scores, they have been classified into five descriptive levels of visual quality: "outstanding", 160-200; "very high", 120-159; "high", 80-119; "moderate", 40-79; and "low", 0-39. The ranking method is described in Appendix A of the report. It should be noted that Tetlow and Sheppard (1977), from which Appendix A is taken, use the expressions "scenic distinction" and "scenic distinction ranking scores" rather than "visual quality" and "visual quality indicator scores", the expressions which are used throughout the present report.

To the west of the Continental Divide, in the McGregor Plateau and Rocky Mountain Trench regions, the visual quality ratings range from "moderate" to "high". The attractiveness of visual units within these regions is largely attributable to the spatial quality of their linear, U-shaped valleys, their meandering rivers, and the mixed deciduous and coniferous vegetation along river banks. Visual vulnerability ratings in these regions are low to moderate, except in the Herrick visual unit, where impacts will be very high due to the presence of deeply-gullied lacustrine soil formations which blanket and/or flank the valley floor.

Within the Rocky Mountain Foothills and the Alberta Plateau Benchlands regions, the most distinctive landscape features are the deeply-incised river canyons and a mixed vegetation cover along the valley bottoms. The alpine flora of the Rocky Mountain Foothills (which occurs in a very small portion of the Study Area only) also contributes to the attractiveness of this region. Visual vulnerability ratings are generally low throughout both regions.

TRANSPORTATION CORRIDORS

For the analysis of proposed corridor alternatives in this report, priority is given to the protection of those landscapes with the highest visual quality ratings by recommending development in alternative areas with low or moderate visual quality ratings. Within these latter areas, development is further directed to those land surfaces with low or moderate visual vulnerability ratings.

Ten transportation corridor options have been identified for detailed study (see ELUSC, 1978). They each offer potential access to a proposed townsite location in the Saxon Ridge area. The ten options form part of three basic corridor options: (i) Corridor A, to Saxon Ridge from the proposed Tumbler Ridge townsite to the north (one option); (ii) Corridor B, to Saxon Ridge from Dome Creek along Highway #16 in the Fraser valley (five options - Corridors B1 to B5); and (iii) Corridor C, to Saxon Ridge from McGregor, also along Highway #16 in the Fraser valley (four options - Corridors C1 to C4). The reader is referred to Figure 7.1. in the main body of the text for the locations of townsite and corridor options.

Within Corridor A, two highway and three rail route options, all technically feasible, have been suggested. Within Corridors B1 to B5 and C1 to C4, no specific road alignments have been identified; however, all corridors could provide technically feasible road access. Rail access is considered to be technically feasible only in Corridors B1, C1 and C2 (see ELUSC, 1978, for detailed discussion).

The evaluation of the corridor and route options has been prepared with reference to: (i) the visual quality of the visual units through which they pass; (ii) the vulnerability of these units to negative visual impacts; and (iii) the opportunities for viewing which are available in the case of highways. Attention has also been focused on the potential impact of proposed routes on visually distinct features, such as lakes or unique landforms, particularly those with a high recreation capability.

In general, as noted above, priority is given to the protection of those landscapes with the highest visual quality ratings. In the case of railway alignments, routes with the lowest visual quality ratings are always preferred; however, roads may be desirable within areas of "very high" or "outstanding" visual quality when access can be achieved without significantly diminishing that visual quality.

HIGHWAYS

Corridors A, B3, B2 and B1 are preferred for highway development. A highway in Corridor A would have less visual impact than would alternatives in Corridors B1 to B3. However, those alignments which cross the Continental Divide provide access to spectacular mountain landscapes. Corridor B3 is preferred to corridors B2 and B1, primarily since the former would minimize the exposure of travellers from southern B.C. to potential minesite activities in the Red Deer Creek valley.

Within Corridor A, the "Direct" road route is preferred over the "Foothills" road route since it both minimizes exposure to minesite activities and provides access adjacent to the Wapiti Canyon, one of the most scenic landscape features within the Study Area.

RAILWAYS

Corridor A is preferred for rail development. Within this corridor, the "Benchlands" route is most favoured, with the "Foothills" route being considered as the intermediate choice, and the "Wapiti" route being considered most undesirable.

Corridor C1 is preferred over corridor B2, should a crossing of the Divide be unavoidable, although neither corridor is considered to be acceptable visually. An alignment through corridor B2 would have severe impacts on the Ovington and Jarvis visual units, both of which are of "outstanding" visual quality, and also on the Middle McGregor visual unit, which has a "very high" visual quality rating. The visual impacts of an alignment through the widespread, deeply-gullied lacustrine materials in corridor B2 would also be high although, in this case, areas with "outstanding" visual quality ratings are not threatened.

TOWNSITES

The most significant visual difference between the three townsite options concerns their respective aspects. Although both the Narraway and Saxon townsites have a southerly exposure, the Narraway townsite receives more sunlight since the latter is partially shaded by Saxon Ridge. The Nekik townsite, with its northwesterly aspect, is exposed to less sunlight than the other two sites. The townsites, therefore, are ranked in the following order of preference: most preferred - the Narraway townsite; intermediate choice - the Saxon townsite; and least preferred - the Nekik townsite.

chapter one

1 INTRODUCTION

1.1. STUDY BACKGROUND

In January of 1976, the provincial Cabinet Coal Committee initiated the Northeast Coal Study in order to evaluate the feasibility of developing the coal reserves of northeastern British Columbia. The intention was to investigate the economic, social and environmental consequences of proceeding with various coal mine developments, and of providing the infrastructural services which these mines would require.

The Environment and Land Use Sub-committee on Northeast Coal Development (ELUSC) was established in February of 1976, and was given responsibility for the evaluation of environmental aspects of the proposed developments. It was directed to implement resource inventory programs during the period between February, 1976, and September, 1978, and implications of alternative townsite locations and various trunk road and rail route options.

The visual endowment of the Study Area is one of nine components of the natural resource base which have been selected for inventory as part of the ELUSC's overall environmental program. The other resource sector components which have been inventoried are climate, terrain, soils, vegetation, wildlife, outdoor recreation, aquatic resources and heritage resources.

The Northeast Coal Study Area was divided into two sections: (i) the northern "Core" Area (or 1976-1977 Study Area), which was inventoried during the 1976-77 field season; and (ii) the Southeast Extension Area (or 1977-1978 Study Area), which was inventoried during the 1977-78 field season.

This report constitutes the technical report for the 1977-1978 Study Area. It continues and expands the work which was undertaken in the 1976-1977 Study Area by R.J. Tetlow and S.R.J. Sheppard, and which is summarized in the report: Visual Resources of the Northeast Coal Study Area 1976-1977 (1977).

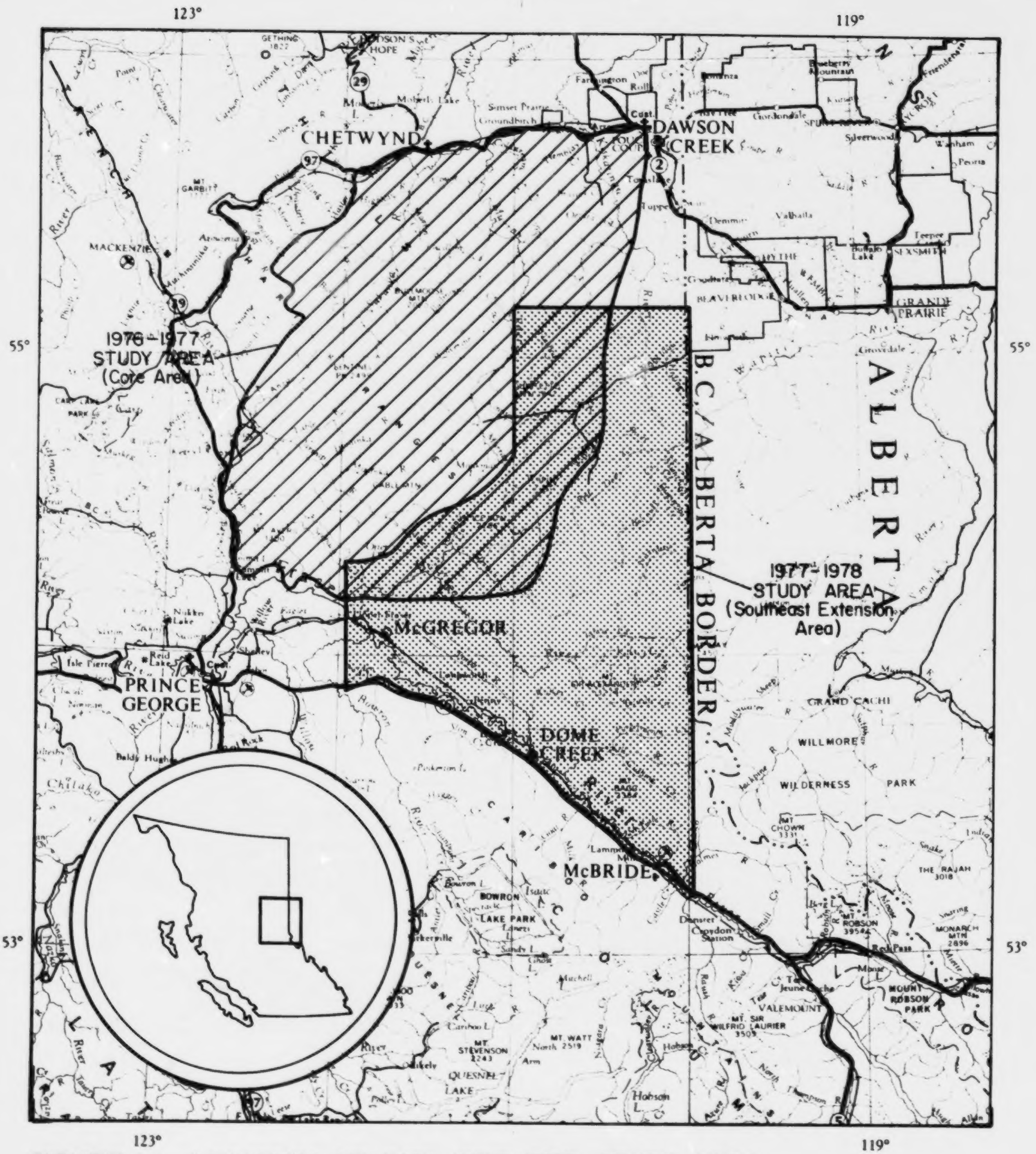

123°
119°
55°
53°
CHETWYND
DAWSON CREEK
MACKENZIE
1976-1977 STUDY AREA (Core Area)
1977-1978 STUDY AREA (Southeast Extension Area)
B.C./ALBERTA BORDER
ALBERTA
GRANDE PRAIRIE
McGREGOR
PRINCE GEORGE
DOME CREEK
McBRIDE
GRAND CACHE
WILLMORE WILDERNESS PARK
VALEMOUNT
MOUNT ROBSON PARK
BOWRON LAKE PARK
QUESNEL LAKE

FIGURE I.1. LOCATION OF THE 1977-1978 STUDY AREA

1.2. LOCATION OF STUDY AREA

The 1977-1978 Study Area is located to the east of Prince George and to the south of Dawson Creek. It extends from the Alberta Plateau Benchlands (along the B.C.-Alberta border)south-westwards across the Rocky Mountains to the Fraser River, which forms its southern boundary. It covers almost 26 000 square kilometres (10,000 square miles), and is mapped in Figure 1.1.

1.3. STUDY OBJECTIVES

The present visual analysis, together with the analysis of the 1976-1977 Study Area, represents the first step towards the development of a landscape management plan for the Northeast Coal Block. The region is presently remote and virtually undeveloped. No major roads, railways, or townsites exist within the area, although forestry is presently being undertaken in the McGregor and Torpy valleys (within the McGregor Plateau region).

With the development of coal properties, the area will be opened up to a much higher intensity of use. A variety of user demands, particularly for outdoor recreation, forest utilization and tourism, will be imposed upon the landscape. Since the access routes and townsites which are selected for coal development will provide the infrastructural framework for the future use of these other resources, it is important that their locations reflect multi-purpose rather than single-use objectives.

To this end, the visual analysis has been designed to evaluate and map the visual character and quality of the entire Study Area. The patterns of visual character and relative visual quality have been recorded, and the analyses of the corridor and townsite location options have been completed within the context of this regional perspective.

More specifically, the tasks of the visual analysis program have been:

(i) to evaluate and map the visual quality and character of the Study Area;

(ii) to map areas of relative visual vulnerability to impacts from linear development;

(iii) to assess the impacts of potential corridor and townsite developments on the visual quality of the Study Area;

(iv) to investigate means for mitigating negative visual impacts;

(v) to provide visual interpretations and guidance for continuing resource management programs; and

(vi) to initiate development of a visual analysis methodology which is consistent in general terms with the biophysical land classification system being developed by the Resource Analysis Branch (now reorganized as part of the Assessment and Planning Division) of the B.C. Ministry of Environment.

Emphasis in this report has been placed on interpretations for the design and location of roads. These are particularly important since they not only provide a framework for the regional land use plan which is expected to develop over time, but will also direct and condition the user's initial perception of the region. Impressions gathered while moving through the landscape accumulate, and create a 'sense of the region' in the traveller's mind. A road which passes through an uninteresting part of the landscape punctuated by borrow pits, clear-cuts and open-pit mines, and which may then reach a town dominated by industrial activity, tends to provide a disjointed and unimpressive experience, although this need not necessarily be the case. By contrast, a road which takes advantage of natural openings in the forest cover to offer a variety of viewing opportunities, and which also provides access to dramatic or unique landscapes, is likely to be a far more memorable and positive experience.

chapter two

2 METHODOLOGY FOR VISUAL ANALYSIS

2.1. INTRODUCTION

The approach employed in the visual analysis of the 1977-1978 Study Area has evolved from, but differs somewhat from, the method utilized in the visual unit analysis of the 1976-1977 Study Area (see Tetlow and Sheppard, 1977). In both areas, a visual unit analysis was initially conducted which focuses on distinguishing between landscapes of relatively higher or lower visual quality, and between land surfaces of relatively higher or lower vulnerability to visual impacts from townsite and corridor developments. The major features of the visual unit approach to visual analysis are briefly outlined in sections 2.2. and 2.3. (below), while a more detailed discussion is presented in Appendix A.

The present report departs from the methods used by Tetlow and Sheppard (1977) in that it attempts to integrate the visual unit analysis with the overall biophysical land classification system of the Assessment and Planning Division (the former Resource Analysis Branch). To this end, visual interpretations are provided for three types of biophysical units - physiographic regions, forest zones and terrain units. The major features of this approach are outlined in section 2.4. of this chapter. The relationship between the visual unit and biophysical approaches is briefly reviewed in section 2.5.

It is recommended that, where large-scale resource developments are being contemplated, as in the Northeast Coal Block, the visual unit be selected as the primary level for the implementation of visual management programs, and that other types of visual interpretation which are generated (e.g. biophysical visual interpretations) should be keyed to individual visual units for user convenience.

2.2. PRINCIPLES OF VISUAL QUALITY AND VISUAL VULNERABILITY ANALYSIS

2.2.1. VISUAL QUALITY[1]

Evaluation of visual quality is approached with reference to three visual properties: vividness, unity and variety. These properties are fundamental to the interpretation of all visual art. Although they are defined separately below, their overlapping nature should be recognized. For example, not all vivid images are necessarily scenic. A degree of unity and/or variety must also be present. The definitions which follow are adapted by the author from Litton (1972) and Jones (1978).

(i) Vividness:

Literally having the appearance of vigorous life or freshness, and producing a strong impression on the senses. Vivid images derive from contrasting landscape elements which combine in striking and distinctive visual patterns. Usually, the greater the contrast in visual elements, the greater the vividness, and hence the higher the visual quality of the landscape.

(ii) Unity:

Literally the state of "being one". Unity refers to the compositional harmony of landscape elements, and is a measure of the degree to which the visual elements of the landscape join together to form a coherent visual pattern. Unity can be perceived in the landscape in terms of the relationship of natural features to each other, and also in the relationship of features to constructed forms such as roads or buildings. "It [unity] is exemplified by pristine landscapes where natural order is paramount, or by cultural landscapes, as in traditional agriculture, where carefully sited or designed alterations fit or enhance the natural order of the landscape and are rational in appearance and function." (Tetlow and Sheppard, 1977). Visual quality tends to be higher in unified landscapes.

(iii) Variety:

An index of how many different objects and relationships are found within the landscape. Greater variety is an indication of higher visual quality, although the number of distinct visual elements which are present does not in itself constitute an overall measure of how variety in the landscape affects its visual quality. Visual order is necessary, and here there is an overlap with unity.

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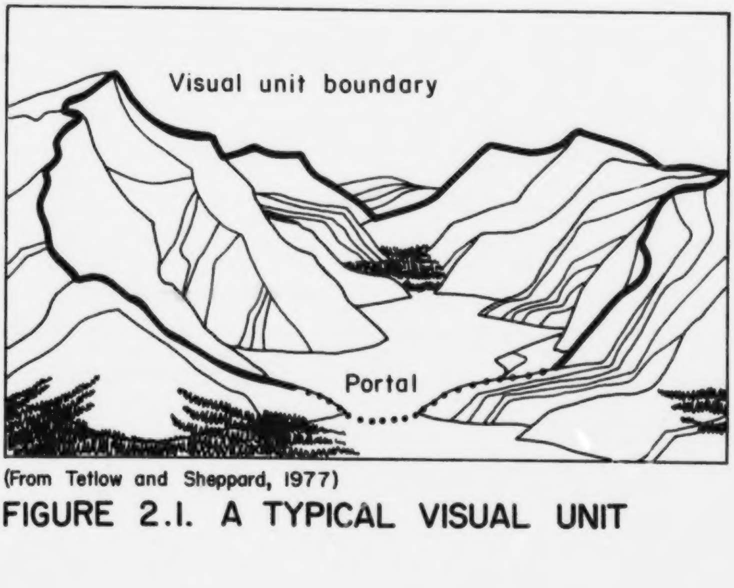
[1] The expression "visual quality", which is employed throughout the present report, is equivalent to the expression "scenic distinction", as coined by Tetlow and Sheppard (1977). Thus, in Appendix A of this report, which is taken without modification from Tetlow and Sheppard (1977), the expression "scenic distinction" appears.

The basic principle which underlies the interpretation of visual quality is that values are high where visual variety occurs within a distinct and unified landscape. The greater the contrast which exists between the visual elements, the more vivid will be the landscape setting. Landscapes of low visual quality typically lack variety and contrast. These criteria are implicit in the evaluation of visual quality, both in the choice and ranking of "visual quality indicators", and in their grouping on a "visual unit" basis. Visual quality indicators are discussed in section 2.3. of this chapter.

2.2.2. VISUAL VULNERABILITY

Visual vulnerability refers to the potential of land surfaces to be degraded by visual alterations arising from man-made development. While some landscapes can absorb major man-made changes with little visual effect, others are highly sensitive to development. Strongly enclosed landscape units, such as valleys (Figure 2.1.), tend to be most vulnerable to visual disturbance because of their visual unity, the high visibility of much of the land surface, and the imposition of horizontal alignments on landscapes which are characteristically patterned by vertical lineaments. Units of weak enclosure are generally less vulnerable to visual impacts since horizontal alignments conform more closely to the horizontal landform patterns in the landscape. Moreover, views of development areas are often screened by vegetation.



(From Tetlow and Sheppard, 1977)

FIGURE 2.1. A TYPICAL VISUAL UNIT

2.3. VISUAL UNIT INTERPRETATIONS

To facilitate the evaluation of visual quality, and to provide a framework for visual management interpretations, the Study Area has been classified into "visual units". Each visual unit represents a discrete land surface, "... a portion of the landscape which is defined by variations in topography and which bounds the observer's field of view. Each visual unit has it's own distinct visual character and degree of unity. Its specific visual quality is created by the combination of landscape elements within it or bounding it." (Tetlow and Sheppard, 1977). Most visual units represent recognizable valley forms where enclosing ridges limit the field of view.

2.3.1. VISUAL QUALITY EVALUATION

Evaluation of visual quality is approached in a manner similar to that for evaluations of other resource components such as terrain, soils or vegetation. The features of a landscape which contribute to its visual quality are isolated and identified as parameters of that quality. Necessarily, however, the evaluation of "visual quality indicators" is based on their scenic expression measured in terms of form, line, colour and texture, rather than on biophysical or engineering criteria, as in the case of terrain, soils or vegetation evaluations.

The selection of the landscape features which are to be used as visual quality indicators is based on an overview analysis of the Study Area. Those features of the landscape which are judged to be most important in contributing to visual quality are chosen. Cumulatively, they define the spatial quality of the topography, the number and character of waterforms, the vegetation patterns, other visually distinctive features, and the presence of man-made features which may sometimes detract from the visual quality of the landscape. For the purposes of the present study, twenty landscape features have been selected as visual quality indicators. They are defined both verbally and graphically in Appendix A (see pp. A.9 to A.18).

The evaluation of these visual quality indicators is undertaken for each visual unit, and each of the indicators is assigned a numerical score. These scores are then totalled to provide a summary ranking for each visual unit. In this manner, landscapes of higher or lower visual quality are defined and organized into discrete management units. An example of a visual unit summary chart follows:

TABLE 2.1.

VISUAL QUALITY INDICATORS - SAMPLE FROM A VISUAL UNIT SUMMARY CHART

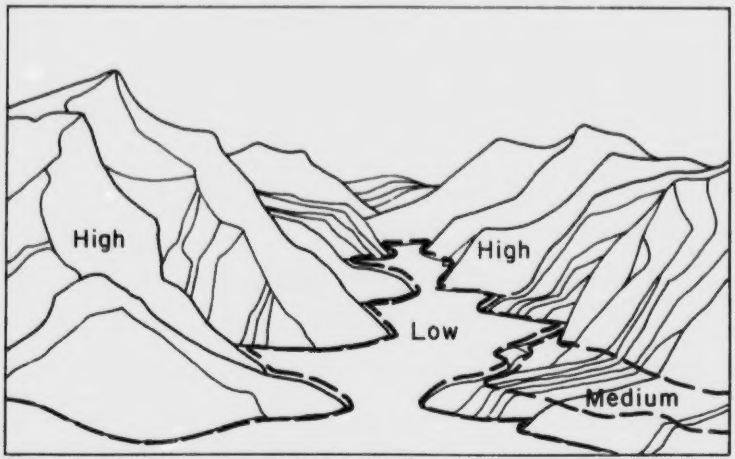
MAP REFERENCE UNIT NAME	SPATIAL DIMENSION & CHARACTER								WATER FORMS					DISTINCTIVE FEATURES & ACCENTS							RANKING SCORE
									EXTENT AND CHARACTER		SHORELINE FORM										
	SPATIAL VIVIDNESS	CROSS-SECTION COMPLEXITY	CROSS-SECTION PROPORTION INDEX	CROSS-SECTION CONTRAST	LINEARITY CONTINUITY	SKYLINE	PROFILE	FLOOR	LAKES	RIVERS STREAMS	LAKES	RIVERS STREAMS	WATER SETTING	SETTING FREQUENCY	FALLS AND RAPIDS	PEAKS, TOPOGRAPHIC ELEMENTS, GEOMORPHIC FEATURES	SNOW AND ICE	VEGETATION CONTRASTS	VISUAL UNIT LINKAGES	IMPACTS & DEGRADING CONTRASTS	
Jarvis	10	10	10	10	10	10	10	10	10	10	10	4	10	10	10	10	10	10	10	10	194
Kakwa	10	10	10	10	4	10,	10	10	10	4	10	4	10	10	4	10	10	4	10	4	164
Cecilia	10	10	10	10	10	4	10	10	10	2	4	4	10	10	2	10	4	10	10	10	160
Ovington	10	10	10	10	4	10	10	10	1	2	1	2	10	10	10	10	10	10	10	10	160
Kitchi	10	10	10	10	4	10	10	10	0	4	0	10	10	4	4	10	10	10	10	10	156
Middle McGregor	10	10	10	10	4	10	10	10	0	10	0	10	10	2	4	10	10	10	10	4	154

Visual quality indicators may be used as an input for site planning. For example, a planner may be assisted in deciding how the visual characteristics of a visual unit can best be incorporated into the design of a road or the locating or a facility by referring to the unit's ranking scores, particularly to those under the headings "Water Forms" and "Distinctive Features and Accents". High scores in the "Topographic Elements" or "Snow and Ice" subsections suggest opportunities for viewing, while high scores in the "Extent and Character" and/or "Shoreline Form" subsections similarly suggest opportunities for viewing, but perhaps also for facility development (such as rest stops, turn-outs, trails, etc). The more important features which were identified during the visual quality indicator evaluations are reported in the visual unit summary descriptions in Chapter Six, and are also located on the 1:100 000-scale visual unit maps, which are available from the Assessment and Planning Division Map Library.

2.3.2. VISUAL VULNERABILITY INTERPRETATION

Within each of the visual units, an assessment of the relative visual vulnerability of land surfaces to developmental impacts has been carried out for the purposes of the present study. Characteristics of slope and surface pattern are used to indicate susceptibility to impacts from linear development. Their sub-variables (e.g. slope, 0-15%; surface/pattern, uniform) have been organized into a graphical matrix to demonstrate the various possible combinations (see Appendix A, Figure A.8.). A ranking scale which rates areas (termed "visual vulnerability sectors", after Tetlow and Sheppard, 1977) as being of "high", "medium", or "low" vulnerability has been developed in conjunction with this matrix (see Appendix A, p. A.22). Generally, land surfaces with steep slopes and vertical or uniform landform and/or vegetation patterns receive high visual vulnerability ratings, while land surfaces with gentle slopes and irregular surface patterns have low visual vulnerability

Plate 2.1.
Features such as these falls in the McGregor River visual unit are identified on the visual unit maps.



(Adapted from Tetlow and Sheppard, 1977)

FIGURE 2.2. VULNERABILITY SECTORS IN A VISUAL UNIT

ratings. Visual vulnerability sectors are mapped on the 1:100 000-scale visual unit maps which were mentioned at the end of section 2.3.1 (above)[2].

2.4. BIOPHYSICAL UNIT INTERPRETATIONS

As was noted in Chapter One, section 1.3., one of the major objectives of the present visual resources program has been to develop a visual analysis methodology which can contribute to the biophysical land classification mapping program of the Assessment and Planning Division. The biophysical approach to land classification is based upon the premise that the land base is an integrated system which is comprised of both biological and physical components. Each component is identifiable as a separate element (e.g. air, water, terrain, soil, plants, fauna), but is recognized to be mutually dependent, in varying degrees, on the other components which make up the total ecosystem. This approach to land description is currently being developed within the Division.

For the present, the biophysical mapping package which was prepared by the predecessor of the Assessment and Planning Division, namely the Resource Analysis Branch, for the Study Area consists of several series of maps (e.g. for terrain, soils, vegetation, wildlife and aquatic systems), each of which is derived, in part, on the basis of a cross-exchange of information with other disciplines. The available mapping for the Study Area is already being employed for many purposes. Interpretations are being provided for a wide range of resource and development concerns (e.g. for forestry, agriculture, outdoor recreation, fisheries, wildlife, and urban, industrial and transportation development), and focussing on a broad range of resource-related topics (e.g. resource capability assessment, resource management options, engineering use potential, and sensitivity to developmental impacts).

In the author's view, it should be possible to use this type of mapping to assist with the generation of interpretations appropriate to the management of the visual resource. Each biophysical unit has a distinct visual character which, although passive in terms of its role in system dynamics, is both amenable to management and susceptible to developmental disturbances. Moreover, changes in system dynamics, such as those which may result from human intervention, are often associated with a predictable and recognizable visual alteration. The existence of this relationship is beneficial in three ways. Firstly, visual management guidelines can be provided rapidly and efficiently for large areas simply by keying visual interpretations to units on existing biophysical maps. Secondly, measures which are designed to minimize visual disturbances will tend to be sound in a broader environmental sense, since they can be developed with reference to both ecological and aesthetic criteria. Thirdly, information upon which to base site design and maintenance programs may be systematically provided.

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[2] The expression "visual vulnerability" is now being replaced in current visual analysis usage by the expression "visual absorption capability" (V.A.C.), where low visual vulnerability would be equivalent to high visual absorption capability, and 'vice versa'.

This report represents a continuing effort by the Assessment and Planning Division to incorporate visual analysis into its overall biophysical classification system (see also Yeomans, 1977b, 1979). The intent here is to offer preliminary guidance to resource managers concerned with visual management issues in the Northeast Coal Block. The methodology which is outlined herein is not regarded as comprehensive, and has yet to be rigorously tested through application to specific design problems.

Visual interpretations are provided for three types of biophysical units, the "physiographic region", the "forest zone" and the "terrain unit". Each type of unit embodies a different degree of integration of biophysical information, as noted below. The physiographic region and the forest zone can provide a framework for regional-scale visual resource management guidelines. The terrain unit represents a local scale of land classification, and the associated visual interpretations are of more site-specific applicability.

(It should be noted that preliminary visual interpretations have also been prepared for vegetation units shown on present ecological condition mapping, and were published in Appendix F, section F.1.6., of ELUSC (1978). More detailed vegetation unit interpretations were beyond the scope of this report. The original interpretations are reproduced in Appendix D, Table D.1., of this report for information purposes).

2.4.1. PHYSIOGRAPHIC REGION INTERPRETATIONS

Physiographic regions are defined by gross variations in topography and bedrock characteristics without reference to other biophysical criteria. Within each of these regions, a degree of visual and ecological consistency has evolved which reflects both a unique combination of biophysical components and their more or less balanced interactions. Since readily perceived landscape patterns are created at this broad scale, the physiographic region breakdown of the Study Area provides a general framework within which visual assessments may be made. Visual interpretations which are prepared for units at this sub-regional scale are useful in two ways:

(i) they provide resource managers with a readily assimilated perspective of the visual character of the Study Area's primary landscapes, thus establishing a frame of reference within which ongoing visual management can take place; and

(ii) they assist in determining at a preliminary stage of development planning the extent, magnitude, and location of visual impacts which may be associated with alternative development options located in different regions (e.g. alternative route corridors).

2.4.2. FOREST ZONE INTERPRETATIONS

A forest zone is an area throughout which climatic climax potential, as reflected in the species composition of the tree canopy, is relatively constant (see Harcombe, 1978). The patterns which are created by the association of different vegetation types within each zone can provide a basis for the classification and description of the visual characteristics of the landscape in terms of its vegetation cover. Among the important visual criteria which are associated with the vegetation cover are species composition, seasonal colour, viewing distance within the forest, and the locations and patterns of vegetation openings. Given a knowledge of biological factors such as regeneration potential and succession, it is possible to predict how the landscape will respond to disturbance and hence, how it will appear following disturbance. Based on these interpretations, the forest zone framework could provide information which is useful in determining landscape enhancement potential and opportunities for visual impact mitigation.

2.4.3. TERRAIN UNIT INTERPRETATIONS

Terrain units are defined on the basis of geological materials, texture of materials, morphology of the land surface, and types of erosion and/or other processes which are acting on, or have in the past acted on, the surface (ELUSC, 1978, Appendix G). They represent areas with distinct physical and visual characteristics.

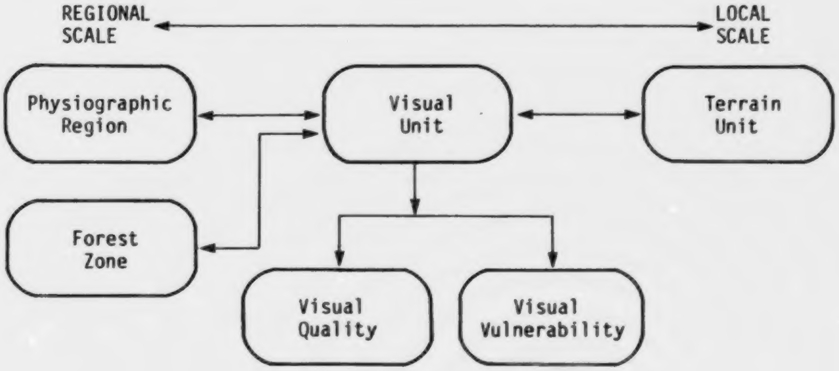
It is not yet certain that visual interpretations can be prepared for all, or even most, types of terrain units. Terrain units are mapped at a scale of 1:50 000, and may tend to be too small for visual management purposes. In fact, it might be necessary to combine terrain units into larger units before visual management issues can be appropriately addressed. It should also be noted that a few terrain units may not have visually significant surface expression. Further research and field testing will be required in order to determine the degree to which terrain units can form a framework for approaching visual design problems (see also Yeomans, 1979). For the present, then, information which is contained here and in Chapter Five on the design relationships between visual analysis and terrain units must be considered highly preliminary....this part of the biophysical analysis is at an early experimental stage.

If, as is hoped, visual interpretations are feasible for most, if not all, terrain units, it should be possible to employ them to: (i) highlight very localized visual management problems and opportunities which may be directly related to engineering considerations; (ii) make it possible to key visual management recommendations to specific sites since the terrain units have been mapped at a scale of 1:50 000; and (iii) provide a basis for management of recurring terrain situations with a single prescription, at least in part, resulting in economy of effort on the part of the visual analyst. Moreover, it is of value to be able to appreciate the overall scope and magnitude of potential visual impacts across varied terrain. Often, it is the accumulation of recurring impacts rather than any one particular site impact which results in the most significant degradation of the visual quality of the landscape.

Although many different types of terrain units were identified by the Northeast Coal Study terrain analysis team, visual interpretations are presented in this report only for lacustrine and avalanche units. It was felt that potential visual impacts in these two types of terrain unit could be both high and extensive, reflecting inherent geological instability. It was not possible, due to the limited time which was available for coordination with the terrain analysis team, to attempt to prepare visual interpretations for all of the numerous types of terrain units which have been recognized in the Study Area. Consequently, it is not known for how many of the terrain units in the region visual interpretations would be possible.

2.5. HIERARCHY OF INTERPRETATIONS

Taken together, the visual unit and biophysical evaluations provide a hierarchy of interpretations which both describe and evaluate the visual character and quality of the landscapes which comprise the Study Area. They facilitate the staged description of the visual resource, beginning at a regional level and progressing to a more detailed or site-specific scale, as illustrated below.



The visual interpretations for the three selected types of biophysical units are presented in Chapters Three through Five. The visual unit interpretations are then presented in Chapter Six, and are designed to summarize not only the visual quality and visual vulnerability interpretations, but also the pertinent biophysical interpretations (on a unit-by-unit basis). As noted in Chapter Two, section 2.1., the visual unit is recommended as the primary level for the implementation of regional-scale visual management programs in the Study Area. It is for this reason that the visual unit has been used as the basis for an overall summary of the visual interpretations which were generated during the Northeast Coal Study.

chapter three

3 VISUAL INTERPRETATIONS FOR PHYSIOGRAPHIC REGIONS

3.1. INTRODUCTION

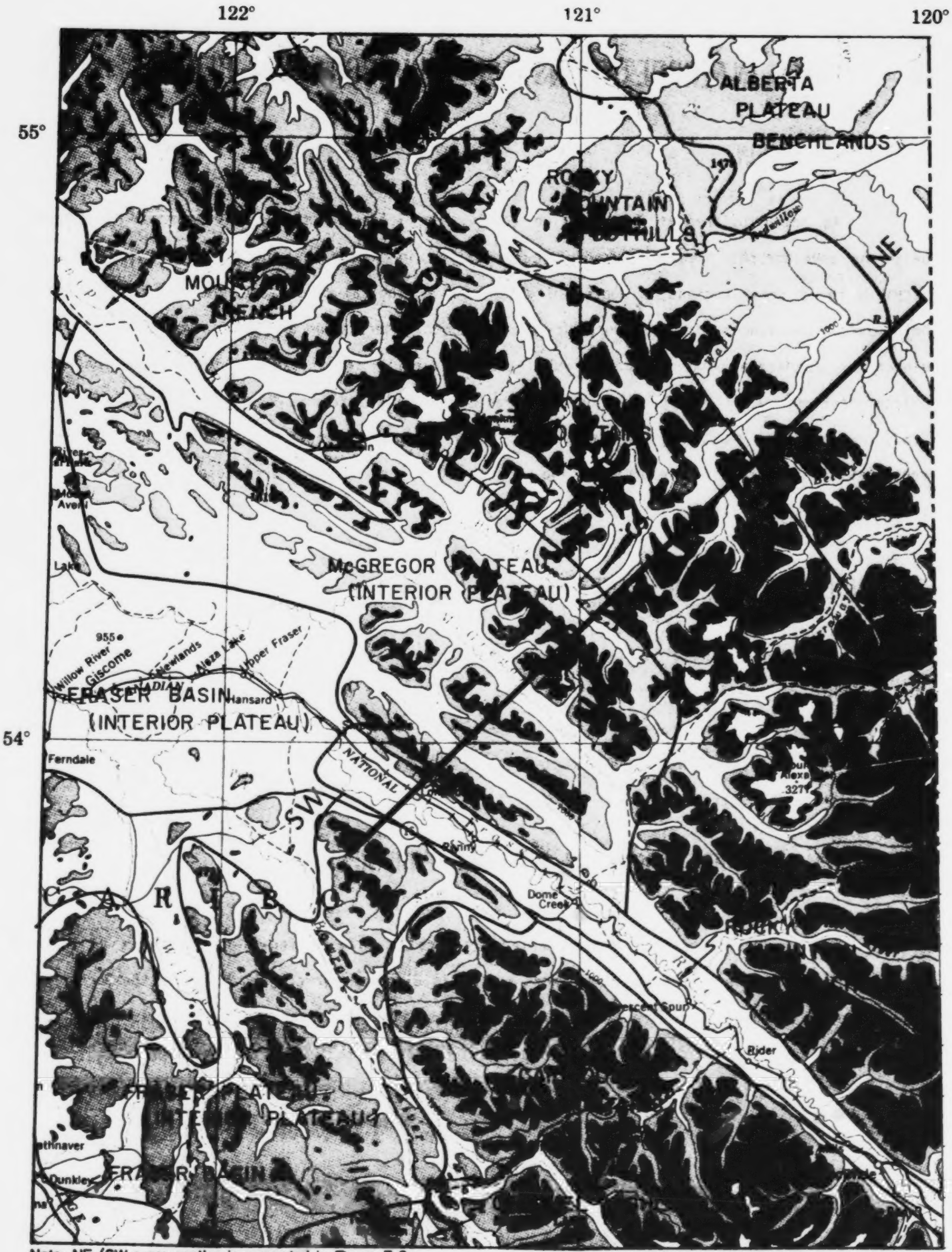
As noted in Chapter Two, section 2.4.1., the landscape may be divided into homogeneous units or physiographic regions based upon variations in topography and bedrock characteristics. Within each of these regions, a degree of visual and ecological consistency is evident, reflecting both the unique combination and more or less balanced interaction of their component biophysical elements. Landscape patterns emerge which produce clearly identifiable and corresponding visual characteristics. As a result, physiographic regions provide a framework within which to assess the Study Area's visual character and quality, and its vulnerability to visual impacts from human interventions such as corridor development. The physiographic regions which are present in the Study Area are mapped in Figure 3.1.

3.2. EVOLUTION OF THE LANDSCAPE

An understanding of the relationship between visually distinct landscape patterns and the physiographic regionalization of the Study Area may be gained in part by reviewing the major evolutionary forces which have shaped the land surface. The annotations in Figure 3.2. outline the six major geological phases which have affected the Study Area's physiography, and describe the landscapes which have resulted.

3.3. VISUAL INTERPRETATIONS BY PHYSIOGRAPHIC REGION

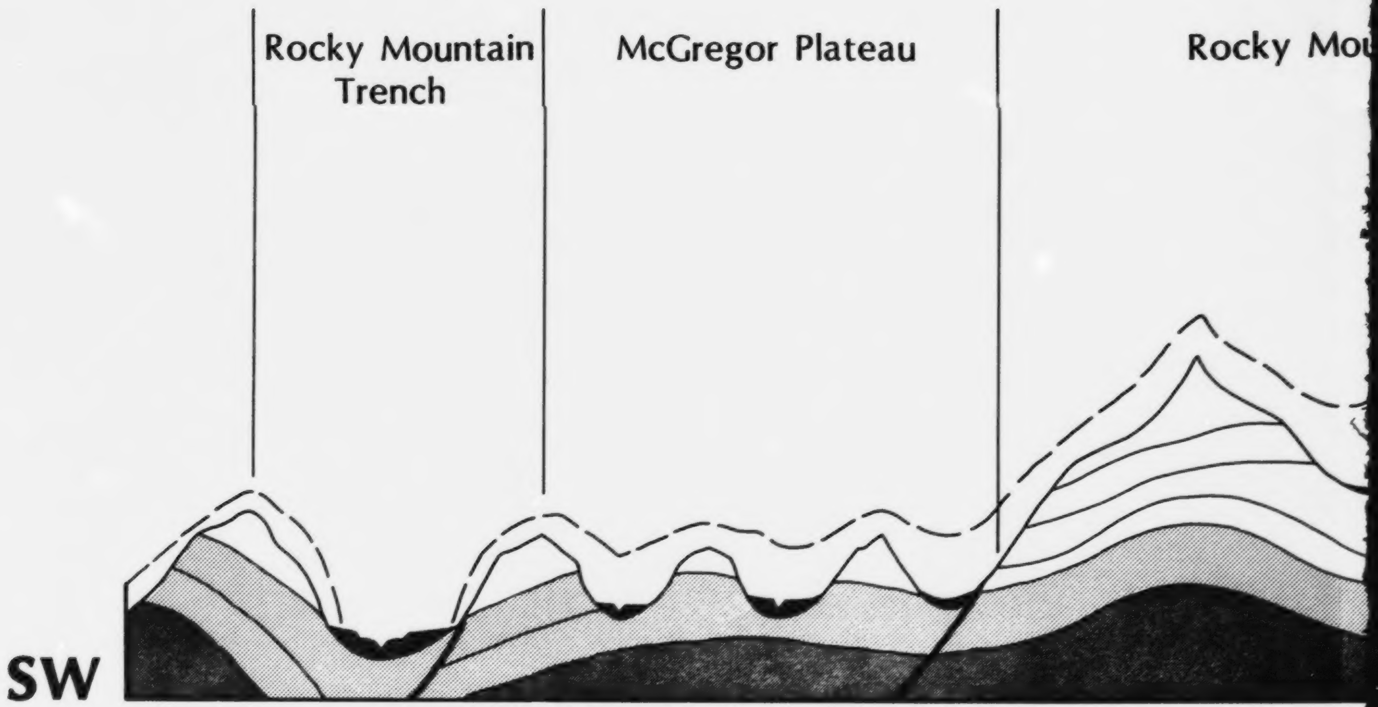
Visual interpretations are presented graphically on a region-by-region basis in Figures 3.3. to 3.6. The Alberta Plateau Benchlands region is discussed in conjunction with the Rocky Mountains Foothills region since the Benchlands are very similar in appearance to the lower-lying areas of the Foothills.


122°
121°
120°
55°
54°
ALBERTA PLATEAU BENCHLANDS
ROCKY MOUNTAIN FOOTHILLS
ROCKY MOUNTAIN TRENCH
McGREGOR PLATEAU (INTERIOR PLATEAU)
FRASER BASIN (INTERIOR PLATEAU)
FRASER PLATEAU (INTERIOR PLATEAU)
FRASER BASIN
ROCKY
CARIBOO
NE
SW
Willow River
Giscome
Newlands
Aleza Lake
Upper Fraser
Hansard
955
Ferndale
Dome Creek
Crescent Spur
Rider
NATIONAL
Dunkley
Mount Alexander
3271
1000

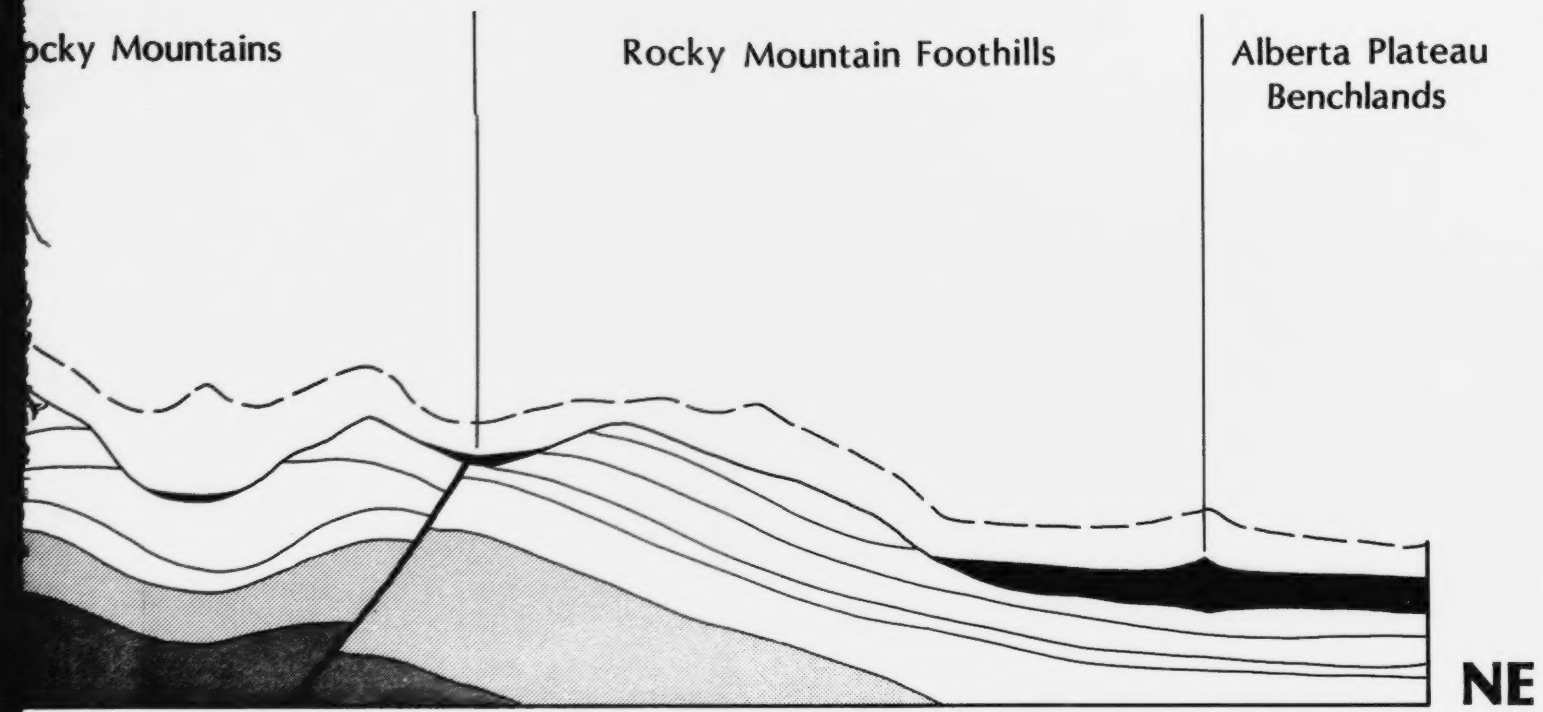
Note: NE/SW cross-section is presented in Figure 3.2.

Source: Adapted from ELUSC, 1978.

FIGURE 3.1. PHYSIOGRAPHIC REGIONS



1. SEDIMENTATION	2. DEFORMATION	3. GLAC
- the consolidated bedrock which underlies the Study Area was laid down as sedimentary strata. - during this depositionary period, the Rocky Mountains region lay off the western shoreline of the North American continent; rivers draining the continent deposited layers of marine sediments into the shallow shelf bordering what was then the ancestral Pacific Ocean; subsidence kept pace with sedimentation so that tens of thousands of metres of shallow-water marine strata accumulated.	- following this period of sedimentation, shifts in the earth's crust generated massive forces which uplifted, folded and faulted the layers of sedimentary strata. - the major rock formations which define the location and boundaries of the Study Area's physiographic regions were moved into their present relative positions by means of these tectonic processes.	- during the peri which followed everything below 2 000 metres (8, - the weight and ice had a prof topography, U-shaped valley mountains.



3. GLACIATION

the period of glaciation
followed, ice covered
hing below an elevation of
metres (8,000 feet).

ight and movement of the
ad a profound effect on
raphy, scouring deep
ed valleys in the high
ins.

4. DEPOSITION

- as the ice sheet melted, the higher peaks and valleys began to emerge earliest; as the ice thinned, progressively more of the terrain emerged, until ice was to be found only in the valley bottoms and lowlands, especially to the west of the Continental Divide; as a result of this mode of ice melting, water became trapped by ice dams as it attempted to escape to lower elevations; ice-dammed lakes were created in the uplands, often in the upper reaches of valleys; great thicknesses of lacustrine materials were deposited in these lakes.

- during this period, water from melting glaciers fed large rivers which carried tremendous amounts of debris; the sediment loads exceeded the transporting capacities of many rivers and, as a result, the valleys were floored with outwash sands and gravels, forming large outwash plains.

5. EROSION

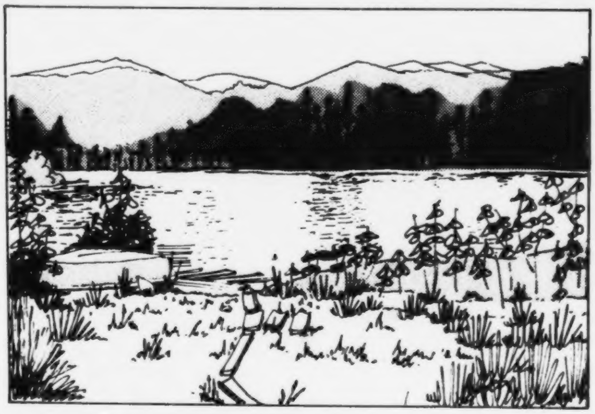
- during the late-glacial and post-glacial periods, river channels eroded downwards, transforming the former outwash plains into new terraces.

- since then, seasonal variations in rains and runoff have further acted to define new river channels and floodplains within the abandonned outwash plains.

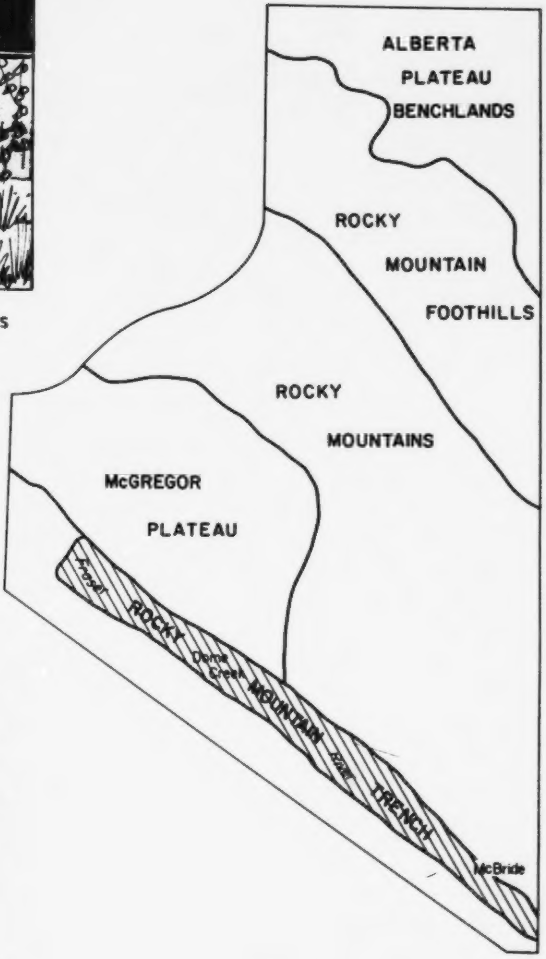
FIGURE 3.2. EVOLUTION OF THE LANDSCAPE

LEGEND

═ SEDIMENTARY STRATA
╱ FAULT LINE
— — PREGLACIAL LAND SURFACE
■ GLACIAL DEPOSITION
— PRESENT LAND SURFACE



Excellent viewing and recreational opportunities exist along the shores of the Fraser River. Presently, little public access or facility development exists to take advantage of these amenities.


ALBERTA
PLATEAU
BENCHLANDS
ROCKY
MOUNTAIN
FOOTHILLS
ROCKY
MOUNTAINS
McGREGOR
PLATEAU
Fraser
ROCKY
Dome Creek
MOUNTAIN
River
TRENCH
McBride

Stre
terra
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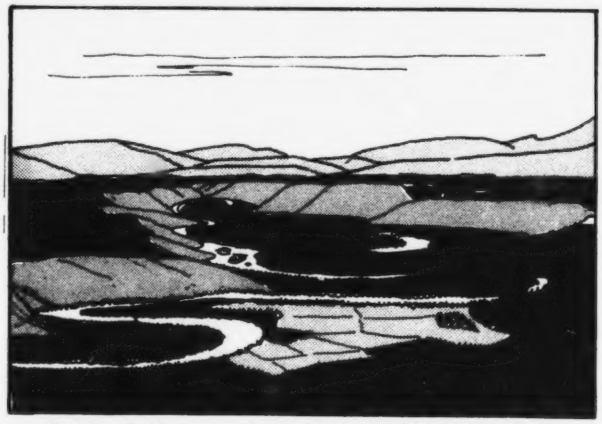
terrace



North of the junction of the Morkill and Fraser Rivers, the breaks between the terraces and the floodplain become increasingly apparent. Potential viewpoints exist along the terrain edges.

The a
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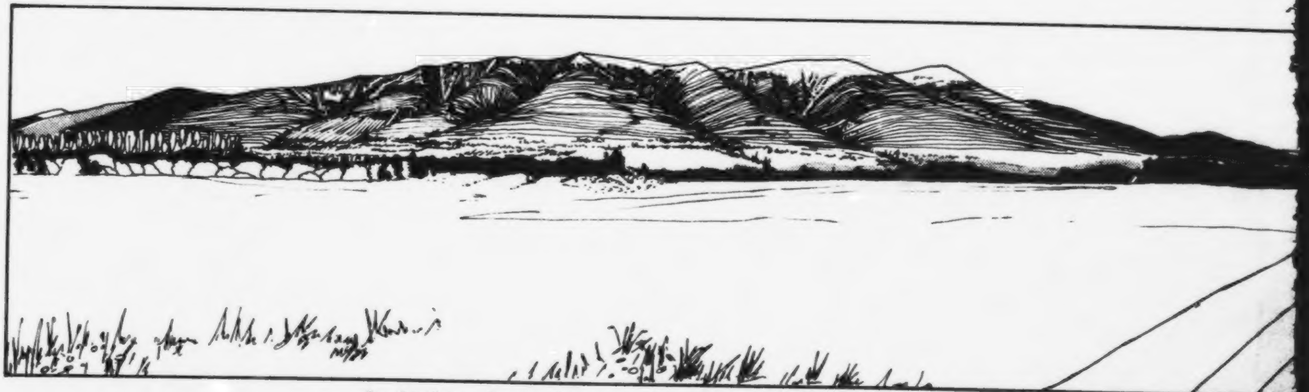
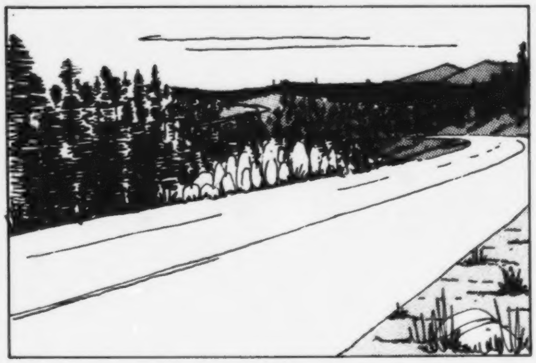
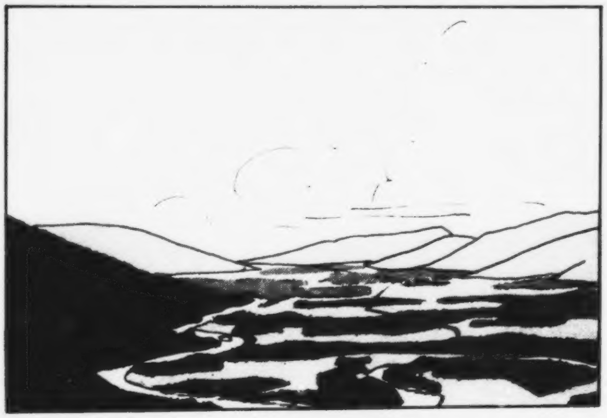


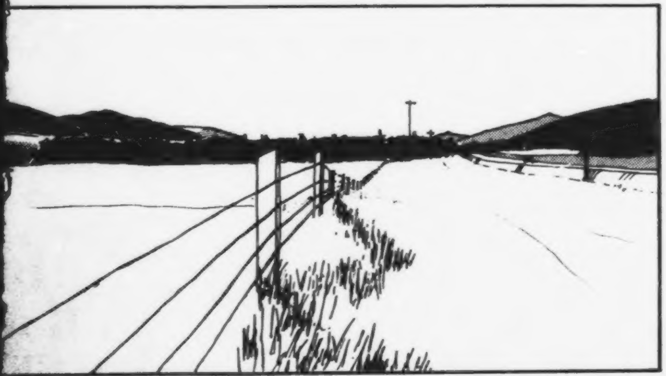
Agricultural openings permit panoramic views of the mountains which enclose the Tre



Streams draining the sides of the Trench cross terraces, thus eroding canyons and deep gullies which break the monotony of the evenly-forested terraces, and also creating viewing opportunities in the otherwise enclosed landscape.



The area around McBride is characterized by the meandering Fraser River, by ox-bow lakes, and by extensive agricultural fields.

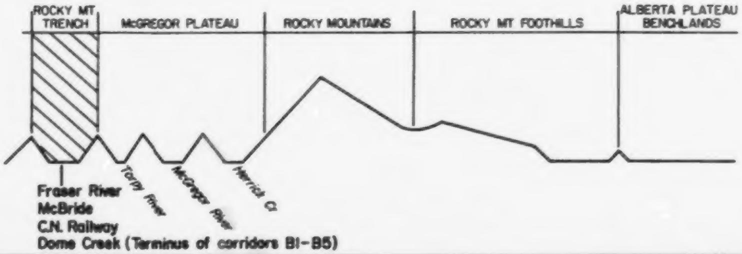


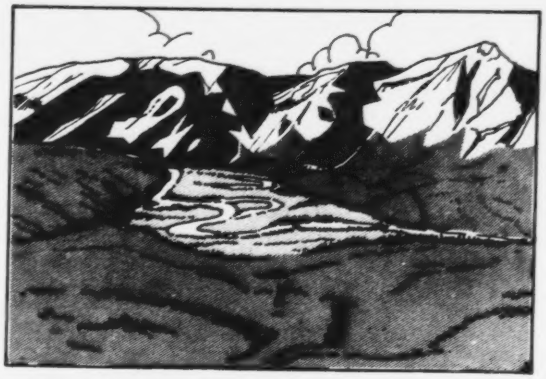
enclose the Trench region.

Physiographic Region Interpretations

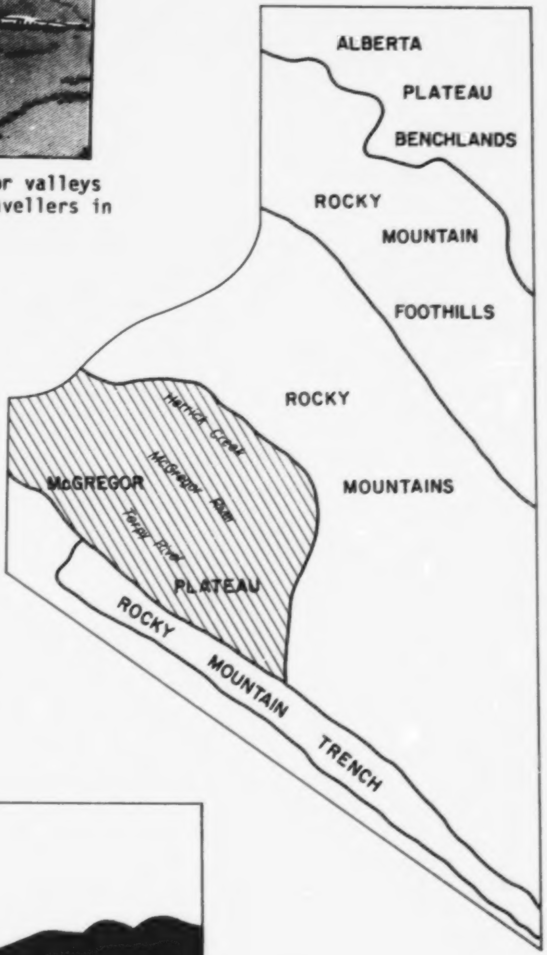
FIGURE 3.3.
ROCKY MOUNTAIN TRENCH

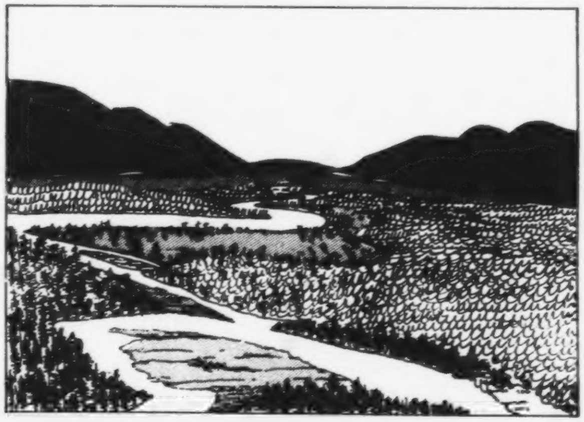
This region is comprised of a single, very broad, trench-shaped valley. Its steep, forested valley walls descend to gently-sloping terrace surfaces which drop, via steep bluffs, to the floodplain of the Fraser River. The broad Fraser River exhibits a placid flow and forms the most distinctive landscape feature of the region.


ROCKY MT TRENCH
McGREGOR PLATEAU
ROCKY MOUNTAINS
ROCKY MT FOOTHILLS
ALBERTA PLATEAU BENCHLANDS
Fraser River
McBride
C.N. Railway
Dome Creek (Terminus of corridors B1-B5)
Torpy River
McGregor River
Herrick Cr



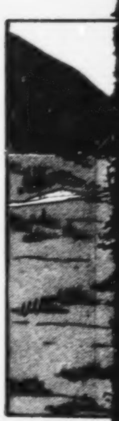
The junction of the Herrick and McGregor valleys forms a highly scenic focal point for travellers in the area.


ALBERTA
PLATEAU
BENCHLANDS
ROCKY
MOUNTAIN
FOOTHILLS
ROCKY
MOUNTAINS
Herrick Creek
McGregor River
Torpy River
McGREGOR
PLATEAU
ROCKY
MOUNTAIN
TRENCH



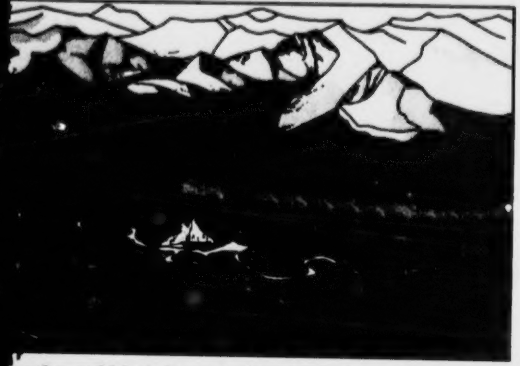
The distinctive visual quality of the McGregor River valley results from the mixed deciduous and coniferous vegetation along the river banks, from vegetation openings created by bogs and fens, and from its strongly linear appearance.

Deeply gulli
floodplain and

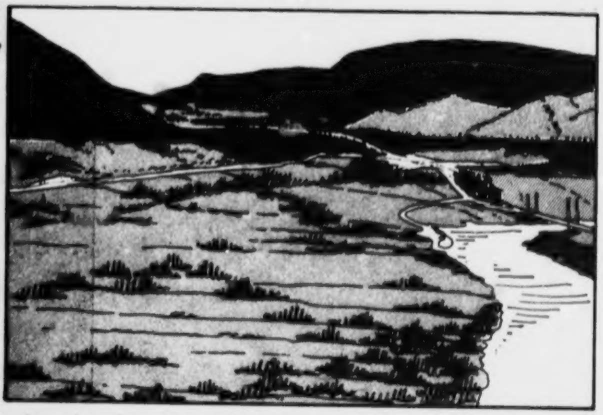


Logging

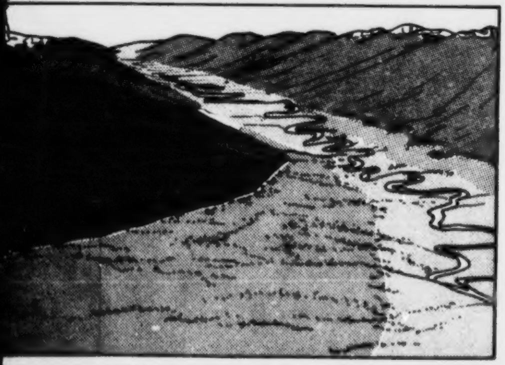
The Torpy Riv
opportunities e
Ridge, whic



eeply gullied lacustrine deposits blanket the dplain and the lower slopes of the Herrick Creek valley.



Logging is presently being carried out in the Torpy and McGregor valleys.

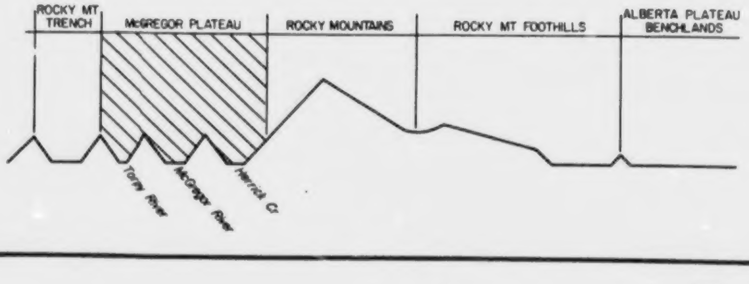


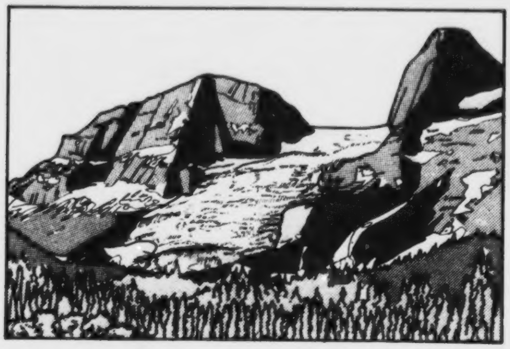
Torpy River valley. Good hiking and viewing tunities exist in the alpine zone along Bearpaw idge, which separates the Torpy and Fraser valleys.

Physiographic Region Interpretations

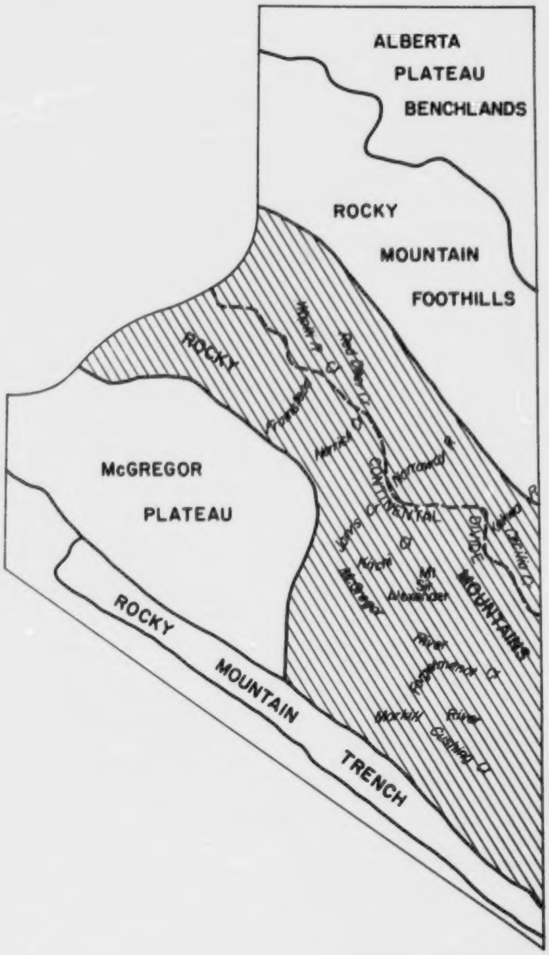
FIGURE 3.4.
McGREGOR PLATEAU

This region is comprised of a series of parallel ridges and valleys which have a northwest-southeast orientation. The three major valleys within the region, the Torpy, McGregor and Herrick valleys, are similar in character to that of the Fraser River valley in the Rocky Mountain Trench, but are much smaller in dimensions. The valleys are long and straight, with mountain walls rising up abruptly from broad, flat valley bottoms.

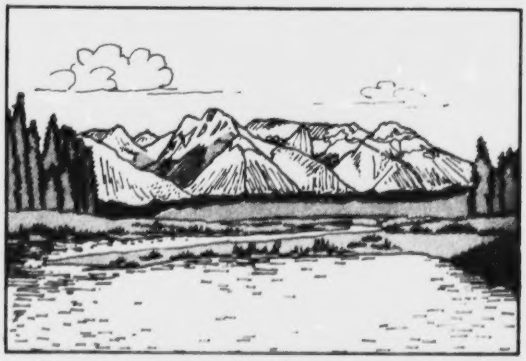

ROCKY MT TRENCH
McGREGOR PLATEAU
ROCKY MOUNTAINS
ROCKY MT FOOTHILLS
ALBERTA PLATEAU BENCHLANDS
Torpy River
McGregor River
Herrick Cr



Nechamus glacier within the Jarvis valley.

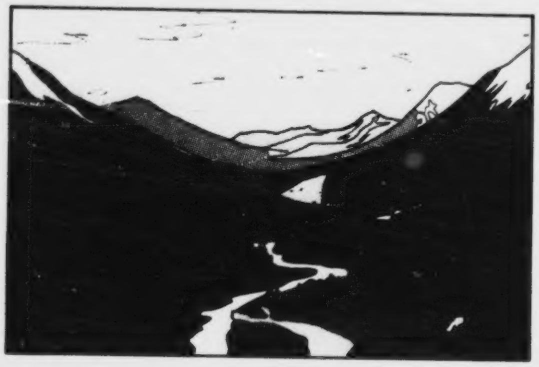


ALBERTA
PLATEAU
BENCHLANDS
ROCKY
MOUNTAIN
FOOTHILLS
ROCKY
McGREGOR
PLATEAU
Wapiti R
Red Deer Cr
Framstead
Herrick Cr
Narraway R
CONTINENTAL
DIVIDE
Jarvis Cr
Kitchi Cr
McGregor
Mt Sir Alexander
MOUNTAINS
River
Forgetmenot Cr
Morkill River
Cushing Cr
ROCKY
MOUNTAIN
TRENCH

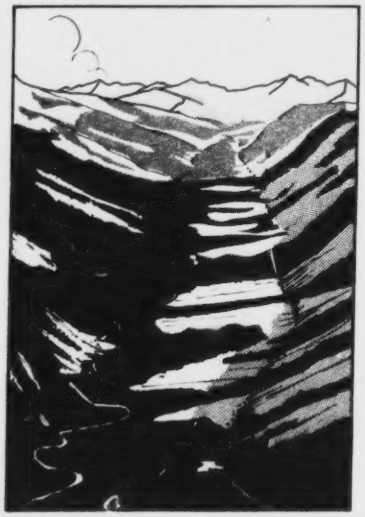


This view of the Mount Sir Alexander mountain massif (from the McGregor valley) is the most spectacular viewscape within any of the proposed corridors.

The upper reach of the Morkill River valley.



The Framstead Creek valley is floored with deeply gullied lacustrine deposits which extend from its junction with the Herrick Creek valley to Framstead Pass.



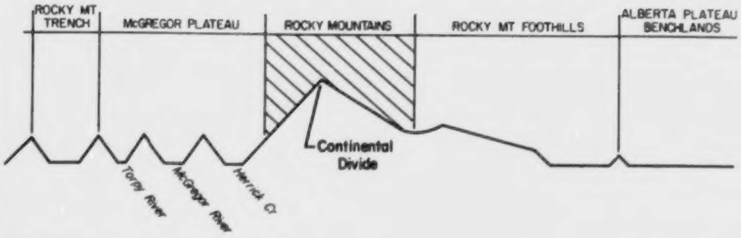
The Cushing valley is characterized by its distinctive U-shaped form and the vivid colour contrasts of the avalanche chutes which line its sides.

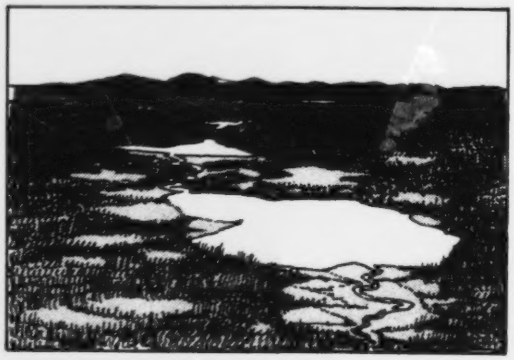
Physiographic Region Interpretations

FIGURE 3.5.
ROCKY MOUNTAINS

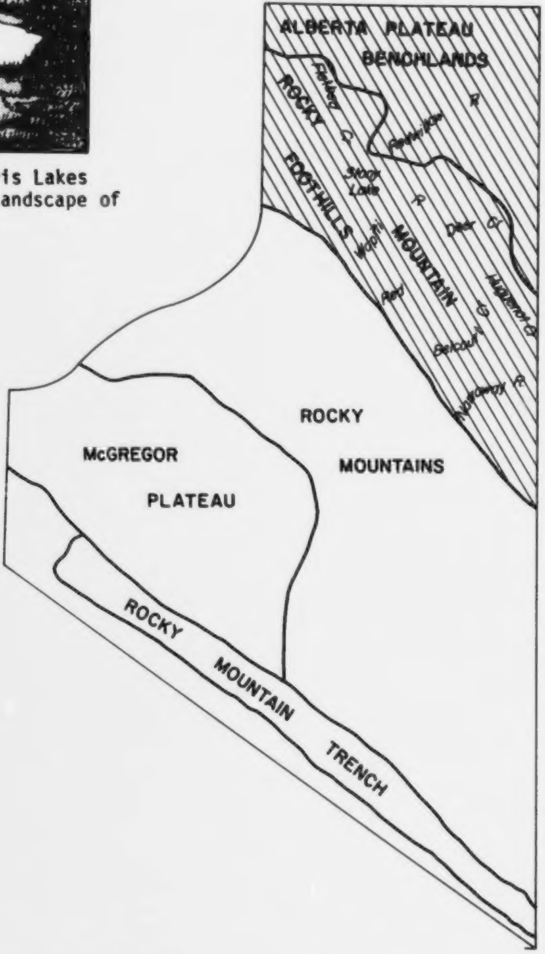
This region consists of a major series of northwest-southeast trending ridges and valleys. The western flanks of the mountains are characterized by: (i) short, narrow valleys, such as the Spakwaniko, Framstead and upper Herrick Creek valleys, which drop steeply to the lower Herrick valley in the McGregor Plateau region; (ii) long, winding valleys such as the Jarvis, Kitchi and upper McGregor valleys, which descend more gently to the middle McGregor valley; and (iii) distinctly linear valleys (in southern areas), such as the Forgetmenot, Morkill and Cushing valleys, which descend gently from the B.C.-Alberta Divide to the Rocky Mountain Trench. The eastern flanks of the mountains are drained dominantly by the broad, gently-sloping, winding valleys of Red Deer and Belcourt Creeks and the Wapiti and Narraway Rivers.

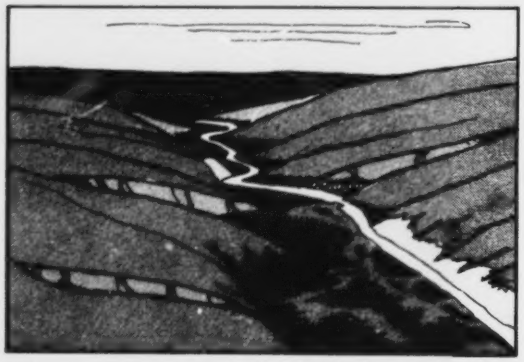
The landscapes within the Rocky Mountains region are the most scenic within the Study Area. The most distinctive areas are found along the Continental Divide, where rocky peaks, pristine lakes, glaciers and waterfalls combine to form vivid landscape patterns. Areas of exceptionally outstanding scenic quality include Mount Sir Alexander, the McGregor River valley between its junctions with Goodson Creek and Kitchi Creek, the Ovington and Jarvis valleys, and Kakwa and Cecilia Lakes. This region is more sensitive to negative visual impacts than any other region in the Study Area. The steep-sided, U-shaped valleys provide little flexibility for adapting development to landscape forms.



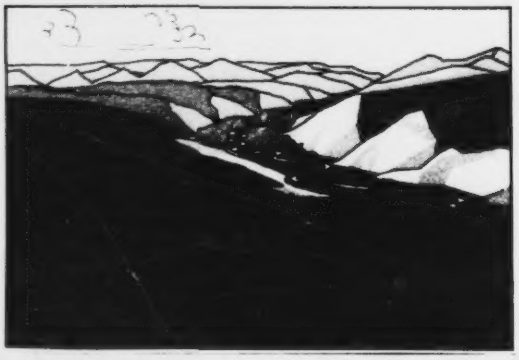


Water features such as Calliou and Iris Lakes provide visual interest in the subdued landscape of the lower Foothills region.


ALBERTA PLATEAU
BENCHLANDS
ROCKY
FOOTHILLS
ROCKY
MOUNTAIN
Flatbed
C.
Redwillow
R
Stony Lake
R
Wapiti
Deer
Cr.
Red
Huguenot Cr.
Belcourt
Cr.
Narraway R.
ROCKY
MOUNTAINS
McGREGOR
PLATEAU
ROCKY
MOUNTAIN
TRENCH

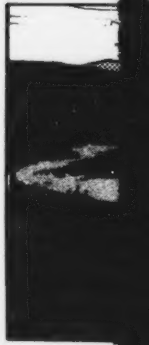


Visual variety in the Foothills and Benchlands regions is attributable to the changing character of the major river valleys, which become progressively more entrenched in an easterly direction.



The broad U-shaped Belcourt Creek valley, where it emerges on to the plains of the Benchlands region.

The dee
landsc



Huguenot Creek
are created
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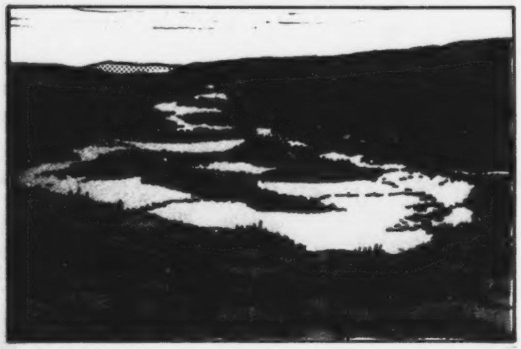
viewing bot

The deeply incised canyons are the most scenic landscape features within the Foothills and Benchlands regions.



Huguenot Creek valley. Openings in the forest which are created by bogs, fens and marshy conditions provide visual variety, and also opportunities for viewing both vegetation patterns and wildlife.

Physiographic Region Interpretations

FIGURE 3.6.
ROCKY MOUNTAIN FOOTHILLS AND ALBERTA PLATEAU BENCHLANDS

Rocky Mountain Foothills

This region is comprised of a series of parallel ridges which attain elevations significantly below those of the Rocky Mountains. The four major valley systems which dominate the region - the Wapiti, Red Deer, Belcourt and Narraway valleys - drain northeastwards, dissecting the northwest-southeast-trending ridges perpendicularly. In the higher, western portion of the Foothills, the valleys are characteristically broad and U-shaped. Where they emerge on to the rolling plateaulands which characterize the eastern Foothills, they gradually become more entrenched and ultimately form deeply incised canyons.

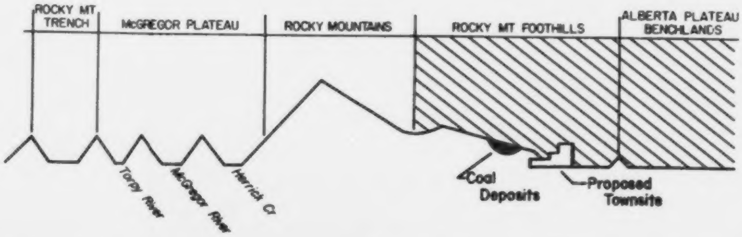
The ridges which intervene between the major valley systems do not form pronounced features or accents, being underlain by soft, relatively erodible shales and sandstones. In eastern portions of the Foothills, topography is very subdued, being hummocky and undulating.

The upper reaches of the broad valleys are densely forested with conifers. Downstream, a transformation to a deciduous/coniferous mix takes place, which, in turn, gives way to relatively open, mixed early seral stands in the lower eastern areas. The openings are attributable to both natural fires and marshy conditions.

Alberta Plateau Benchlands

A series of flattish plateaus with low, but steep, forested edges characterizes the Alberta Plateau Benchlands in the northeastern portion of the Study Area. With the exception of views from these edges, plus a few isolated waterscapes, the forests tend to be relatively uniform although openings in the forest canopy may provide some visual variety.

The Benchlands region is not highly susceptible to negative visual impacts from road and rail development.



chapter four

4 VISUAL INTERPRETATIONS FOR FOREST ZONES

4.1. INTRODUCTION

Three major forest regions are present in the Study Area, the Boreal, Subboreal and Interior Wet Belt Forest Regions. This regionalization broadly reflects various macroclimatic influences on vegetation. The forest regions are subdivided, on the basis of vertical (or altitudinal) zonation, into six major vegetation zones as follows (Harcombe, 1978):

Subboreal Region

- Alpine tundra zone
- Subalpine Engelmann spruce - alpine fir zone
- Subboreal white spruce - alpine fir zone

Interior Wet Belt Region

- Alpine tundra zone
- Subalpine Engelmann spruce - alpine fir zone
- Interior western red cedar - white spruce zone
- Interior western hemlock - western red cedar zone

Boreal Region

- Subalpine Engelmann spruce - alpine fir zone
- Boreal white spruce zone

A forest zone is an area throughout which climatic climax potential, as reflected in the species composition of the tree canopy, is relatively constant. Within each zone, a range of characteristic edaphic (site-modified) climaxes may exist (see Harcombe, 1978).

4.2. VISUAL INTERPRETATIONS BY FOREST ZONE

The locations of the forest regions and their constituent forest zones are shown in Figure 4.1. Visual interpretations for each zone are tabulated in Tables 4.1. through 4.6. Although the Subalpine Engelmann spruce-alpine fir and Alpine tundra zones differ somewhat from one forest region to another, visual interpretations are presented only once for each zone (in Tables 4.1. and 4.2.). Any regional differences which are relevant visually are discussed in these two tables.

4.2.1. ALPINE TUNDRA ZONE

TABLE 4.1.

ALPINE TUNDRA ZONE

ZONE LOCATION	CHARACTERISTIC VEGETATION & LANDFORM PATTERNS	VISUAL QUALITY*	VULNERABILITY TO VISUAL IMPACTS*	ALIGNMENT DESIGN CONSIDERATIONS*
- elevations above 1 830 m (6,000 ft) within the Rocky Mountain Trench, McGregor Plateau and Rocky Mountains physiographic regions	- hard, grey bedrock formations of limestone and dolomite have resisted glacial processes; the topography, as a result, is characterized by sharp ridge lines and distinctive peaks - colonized by a variety of herbaceous plants	- its attractiveness arises from the sutble and colourful vegetation patterns, viewed against a backdrop of grey and brown rock formations - zone offers excellent panoramic views of adjacent landscapes	- subtle small-scale vegetation and landform patterns are easily dominated by linear patterns - regeneration of disturbed sites is very slow	- visual impacts can be minimized by designing alignments to conform to changes in topography - a longer route which follows a contour, for example, will have less impact than a shorter one which requires more excavation and does not conform to the land surface - minimize site disturbance in areas adjacent to alignments
- elevations above 1 830 m (6,000 ft) within the Rocky Mountain Foothills physiographic region	- soft, brown bedrock formations of shale and sandstone have been weathered by glacial processes; the topography, being rounded, is less distinctive than in the above-listed physiographic regions - due to greater degree of soil formation and variable soil chemistry, a wider variety of herbaceous plants is present			

* The comments on "visual quality", "visual vulnerability" and "alignment design considerations" are applicable to the Alpine tundra zone within all of the physiographic regions within which the zone occurs.

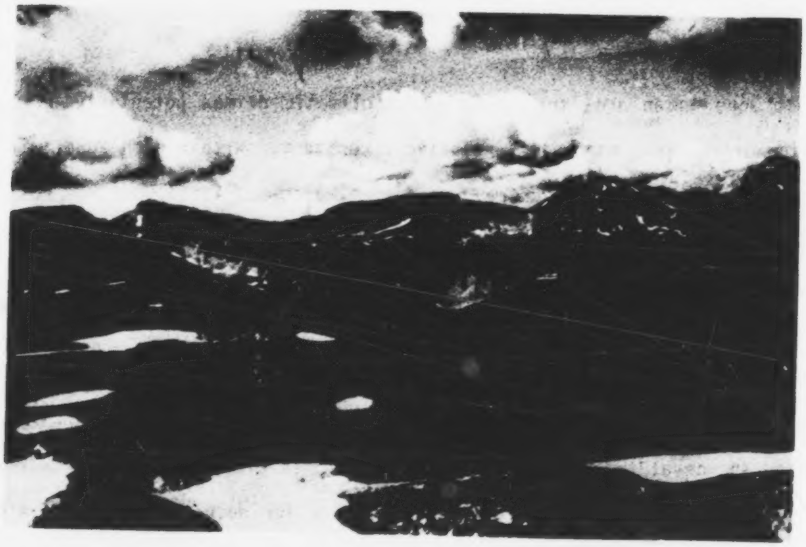
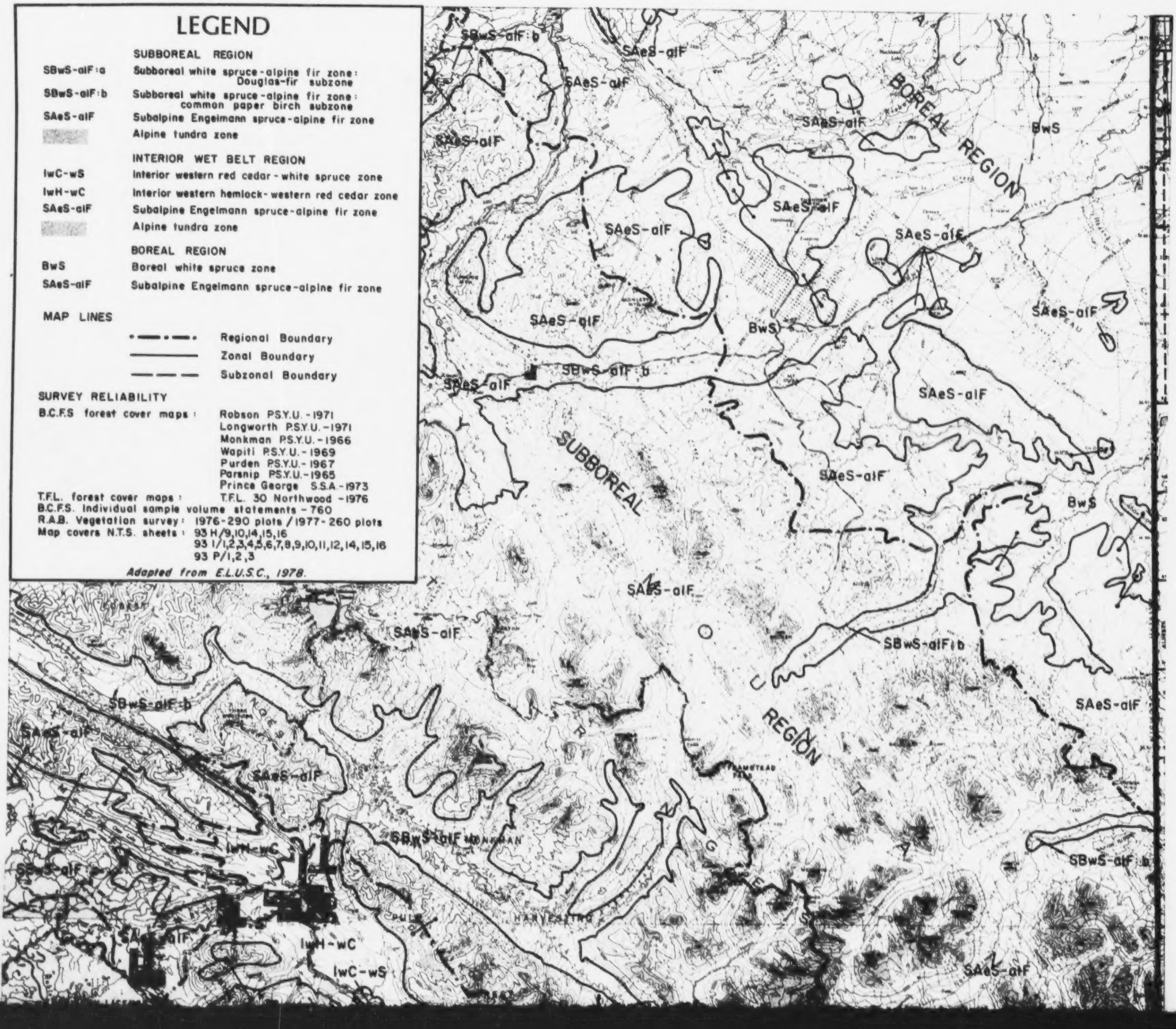
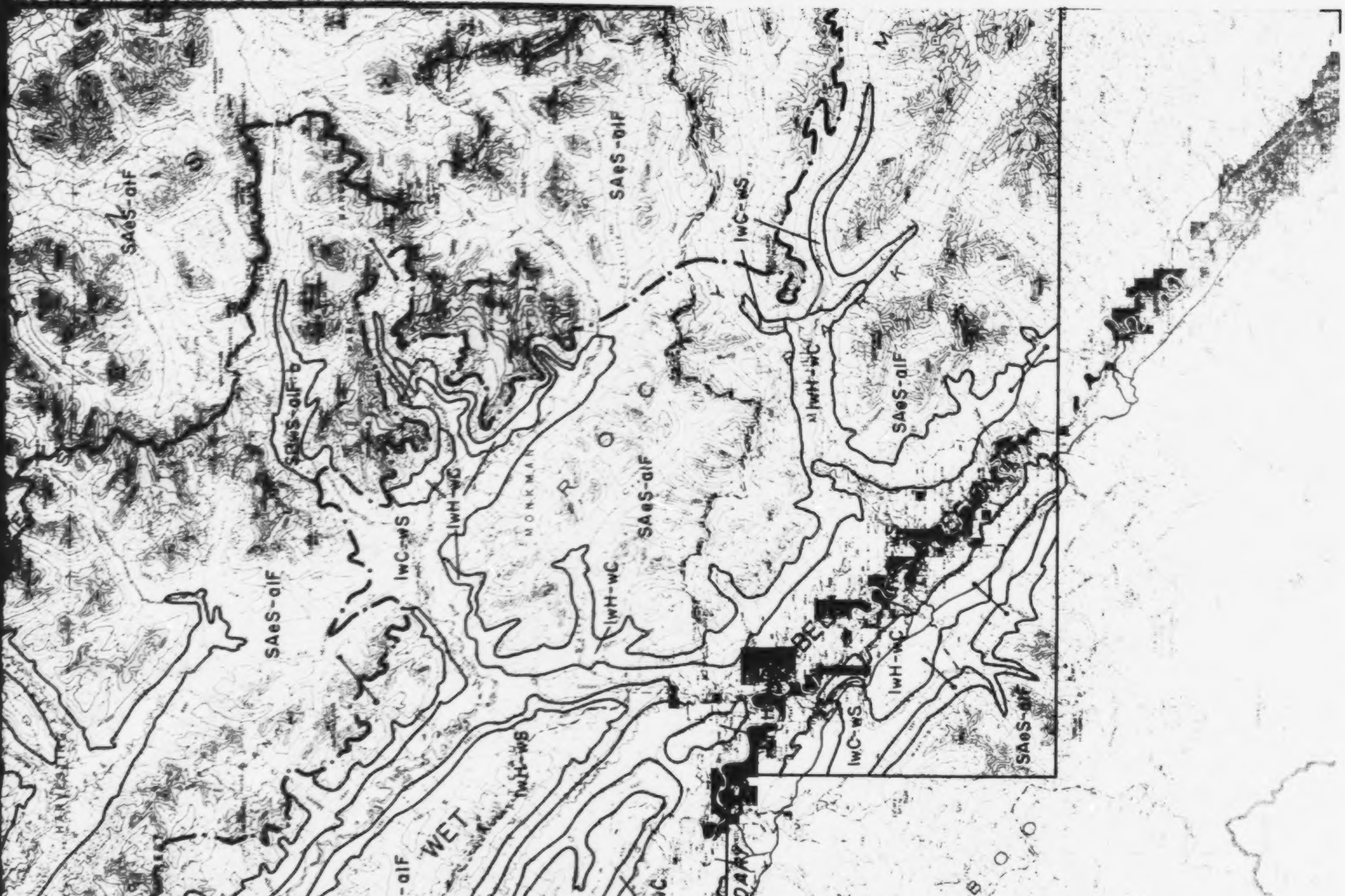


Plate 4.1.
Hard, grey rock formations characterize the alpine areas within the Rocky Mountain Trench, McGregor Plateau and Rocky Mountains regions.


LEGEND
SUBBOREAL REGION
SBwS-alF:a Subboreal white spruce-alpine fir zone: Douglas-fir subzone
SBwS-alF:b Subboreal white spruce-alpine fir zone: common paper birch subzone
SAeS-alF Subalpine Engelmann spruce-alpine fir zone
Alpine tundra zone
INTERIOR WET BELT REGION
IwC-wS Interior western red cedar-white spruce zone
IwH-wC Interior western hemlock-western red cedar zone
SAeS-alF Subalpine Engelmann spruce-alpine fir zone
Alpine tundra zone
BOREAL REGION
BwS Boreal white spruce zone
SAeS-alF Subalpine Engelmann spruce-alpine fir zone
MAP LINES
Regional Boundary
Zonal Boundary
Subzonal Boundary
SURVEY RELIABILITY
B.C.F.S forest cover maps: Robson P.S.Y.U. - 1971
Longworth P.S.Y.U. - 1971
Monkman P.S.Y.U. - 1966
Wapiti P.S.Y.U. - 1969
Purden P.S.Y.U. - 1967
Parsnip P.S.Y.U. - 1965
Prince George S.S.A. - 1973
T.F.L. forest cover maps: T.F.L. 30 Northwood - 1976
B.C.F.S. Individual sample volume statements - 760
R.A.B. Vegetation survey: 1976-290 plots / 1977-260 plots
Map covers N.T.S. sheets: 93 H/9,10,14,15,16
93 I/1,2,3,4,5,6,7,8,9,10,11,12,14,15,16
93 P/1,2,3
Adapted from E.L.U.S.C., 1978.
BOREAL REGION
SUBBOREAL
REGION
SBwS-alF:b
SAeS-alF
BwS
IwH-wC
IwC-wS
MONKMAN
HARVESTING


SAeS-alF
IwC-wS
IwH-wC
IwH-wS
INTERIOR
WET
STUDY AREA BOUNDARY
MONKMAN
Z
Scale of Kilometres

NORTHEAST COAL STUDY: 1977-1978

FIGURE 4.1. VEGETATION ZONES

This map contains portions of N.T.S. sheets 93H, I & P. Base map provided by Surveys and Mapping Branch, Ministry of Environment, Province of British Columbia.

Plate 4.2.
The soft, brown sandstones and shales of the Rocky Mountain Foothills region have given rise to a rounded alpine landscape.

4.2.2. SUBALPINE ENGELMANN SPRUCE - ALPINE FIR ZONE

TABLE 4.2.

SUBALPINE ENGELMANN SPRUCE - ALPINE FIR ZONE

ZONE LOCATION	CHARACTERISTIC VEGETATION & LANDFORM PATTERNS	VISUAL QUALITY	VULNERABILITY TO VISUAL IMPACTS	ALIGNMENT DESIGN CONSIDERATIONS
- krummholz subzone extends from 1 585 - 1 830 m (5,200 - 6,000 ft) in all physiographic regions	- characterized by patches of stunted tree vegetation in an open, park-like setting - on dry sites, heather forms the shrub layer, and on wet sites, grassy alpine meadows occupy the open areas - topography is gently sloping to steep	- the attractiveness of the krummholz subzone results from both the open vegetation pattern and the variety of colours in the shrub and herb layer during the spring and summer - open vegetation provides excellent views of the zone itself and of adjacent and distant landscapes	- low vulnerability to visual impacts due to open vegetation pattern, which reduces the contrast of the right-of-way clearing with the forest canopy - regeneration of disturbed vegetation is slow, which may increase vulnerability to visual impact	- road alignments which are sensitive to variations in topography, and which take advantage of vegetation openings to enframe and create perspective views of landscape features, would provide a pleasing driving experience - site disturbance should be minimized since revegetation is very slow
- forested subzone extends from 1 130 1 585 m (3,700 5,200 ft) in all physiographic regions	- characterized by a dense Subalpine Engelmann spruce - alpine fir zone forest cover - topography is mostly steep i.e. 30% plus - avalanches are common - an area of open forest at the transition between the krummholz and forested subzones is created by excessive moisture which inhibits tree growth	- the attractiveness of the closed forested subzone is enhanced by the dramatic vertical avalanche patterns, these being set off by the contrast in colour between the seral (slide alder) and climax forest vegetation	- highly vulnerable to visual impacts since right-of-way clearings stand out against the even forest canopy - horizontal alignments would be in conflict with the vertical vegetation patterns caused by avalanching	- locate alignments as close to the toes of slopes as possible - alignments should follow the contour, particularly where an alignment traverses ridges; this serves to minimize cut and fill requirements, which often create highly visible scars

Plate 4.3.
The krummholz subzone is characterized by stunted tree vegetation.

Plate 4.4.
Flowers assume greater visual prominence on wetter sites, which often mark the transition between the alpine and subalpine forest zones.

Plate 4.5.
In the transitional area between the krummholz and subalpine forested subzones, extended snowpack is associated with an open forest landscape. Lush subalpine meadows often occur in these openings.

Plate 4.6.
Avalanche chutes provide visual variety within the otherwise uniform forest cover of the subalpine forested subzone.

4.2.3. SUBBOREAL WHITE SPRUCE - ALPINE FIR ZONE

TABLE 4.3.

SUBBOREAL WHITE SPRUCE - ALPINE FIR ZONE

ZONE LOCATION	CHARACTERISTIC VEGETATION & LANDFORM PATTERNS	VISUAL QUALITY	VULNERABILITY TO VISUAL IMPACTS	ALIGNMENT DESIGN CONSIDERATIONS
- occupies elevations below 1 160 m (3,800 ft) on the eastern slopes of the Rocky Mountains within the Subboreal Forest Region - on the western slopes of the Rocky Mountains, this zone occupies elevations below 1 100 m (3,600 ft) northwest of the McGregor River valley	- characterized by a continuous forest cover of alpine fir and white spruce - gently-sloping, ridged, and terraced landforms	- the attractiveness of this zone arises from large mature trees and the diverse mix of species which characterize its climax forests - viewed from roads, the bold, vertical tree trunks in the foreground are attractive features, although views through the forest are restricted due to dense understory vegetation - middleground and distant views are restricted due to screening by the dense vegetation	- visual impacts will be moderate, being associated with the contrast of right-of-way clearing with the dense forest canopy on gently-sloping terrain	- alignments which conform to variations in the topography will appear to fit the landscape in spite of the contrasts created by right-of-way clearing

Plate 4.7.

Mature forest within the Subboreal white spruce - alpine fir zone.

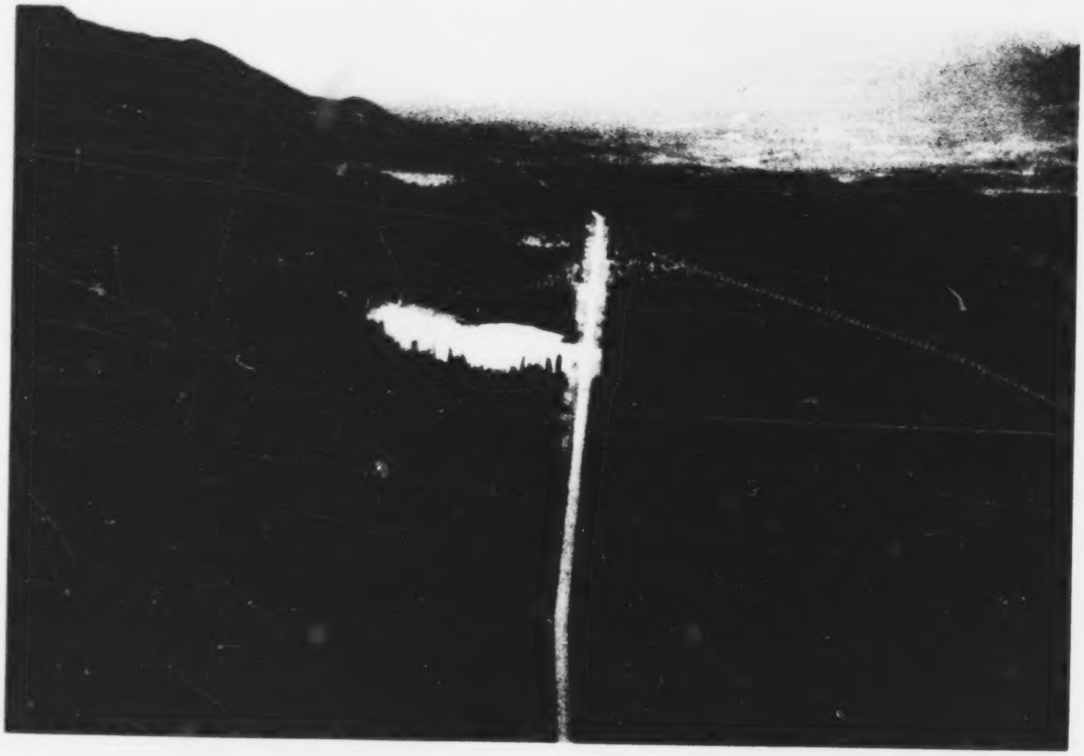


Plate 4.8.
The geometrical form of this road alignment accentuates the contrast between the right-of-way clearing and the dense forest canopy.

4.2.4. INTERIOR WESTERN RED CEDAR - WHITE SPRUCE ZONE

TABLE 4.4.

INTERIOR WESTERN RED CEDAR - WHITE SPRUCE ZONE

ZONE LOCATION	CHARACTERISTIC VEGETATION & LANDFORM PATTERNS	VISUAL QUALITY	VULNERABILITY TO VISUAL IMPACTS	ALIGNMENT DESIGN CONSIDERATIONS
- occupies elevations below 800 m (2,600 ft), i.e. valley bottoms within the McGregor, Torpy and Fraser River valleys of the Interior Wet Belt Forest Region - it is restricted to areas exposed to advective and radiation frosts within these valley bottoms	- characterized by a continuous forest cover of western red cedar and white spruce, with openings created by fens and bogs - visually very similar to the Subboreal white spruce - alpine fir zone, but distinguished from it by the abundance of western red cedar, the increased number of vegetation openings created by fens and bogs, and the increased diversity of vegetation along the river banks - gently-sloping, ridged and terraced landforms	- the attractiveness of this zone arises from the large mature western red cedar trees, the vegetation openings created by fens and bogs, and the deciduous/coniferous vegetation mix along the river banks	- visual impacts from right-of-way clearings would be low, due to the gently-sloping terrain and the opportunities in some locations to take advantage of openings in the forest cover to reduce visual contrasts	- the design of road alignments should take advantage of existing vegetation clearings to open views to landscape features such as glaciers, mountain peaks, avalanche chutes and/or riverine environments

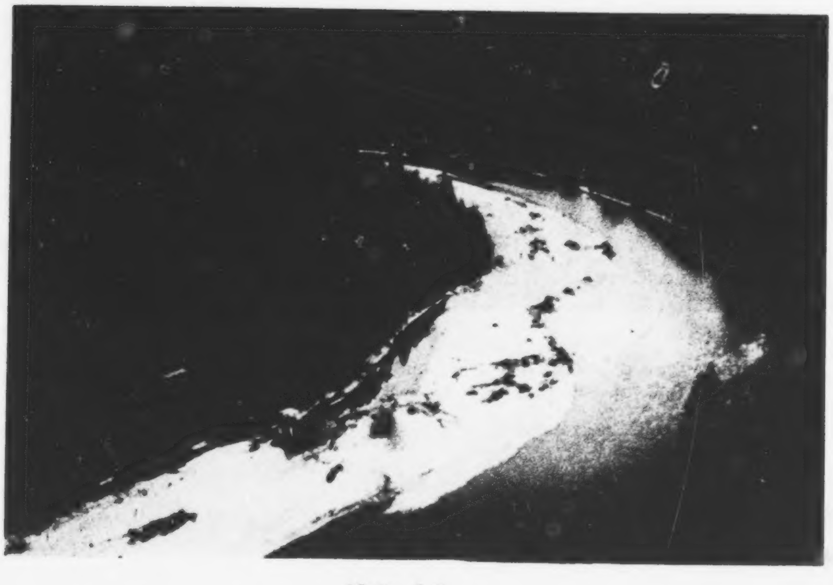


Plate 4.9.
Western hemlock and black cottonwood trees are found on fluvial terraces and colluvial fans.

Plate 4.10.
Openings in the forest cover, occupied by bogs and fens, provide opportunities to view landscape features.

4.2.5. INTERIOR WESTERN HEMLOCK - WESTERN RED CEDAR ZONE

TABLE 4.5.

INTERIOR WESTERN HEMLOCK - WESTERN RED CEDAR ZONE

ZONE LOCATION	CHARACTERISTIC VEGETATION & LANDFORM PATTERNS	VISUAL QUALITY	VULNERABILITY TO VISUAL IMPACTS	ALIGNMENT DESIGN CONSIDERATIONS
- located within the Interior Wet Belt Region on mountain slopes at elevations between 800 - 1 190 m (2,600 - 3,900 ft) - it lies between the Subalpine Engelmann spruce - alpine fir zone, which occurs at higher elevations, and the Interior western red cedar - white spruce zone, which occurs at lower elevations	- characterized by an even forest canopy - stunted forests tend to develop on poorly drained deposits, whereas fluvial terraces and colluvial fans tend to sustain relatively productive forests - avalanche tracks extend into this zone - terrain is moderately-sloping to steep	- the attractiveness of this zone, viewed from within the canopy, is associated with the large western red cedar and western hemlock trees, and the relatively open forest floor	- visual impacts from route development would be moderate to high due to the incongruity created by right-of-way clearing in the dense forest canopy, particularly on steeper slopes - secondary growth typically forms a visual barrier along edges of existing rights-of-way; this accentuates the contrasts created between right-of-way clearing and the forest canopy, and also obscures views into the forest	- avoid locating alignments on steep slopes, where possible - the visibility of right-of-way clearing can be reduced by keeping alignments as low on slopes as possible, and by reducing the width of right-of-way clearing

Plate 4.11.
Western hemlock forest with open forest floor; western hemlock is the climatic climax species for the Interior western hemlock - western red cedar zone.

Plate 4.12.
Mature western red cedar trees, with an understory of devil's-club and lady fern, are characteristic on wetter sites within the Interior western hemlock - western red cedar zone.

4.2.6. BOREAL WHITE SPRUCE ZONE

TABLE 4.6.

BOREAL WHITE SPRUCE ZONE

ZONE LOCATION	CHARACTERISTIC VEGETATION & LANDFORM PATTERNS	VISUAL QUALITY	VULNERABILITY TO VISUAL IMPACTS	ALIGNMENT DESIGN CONSIDERATIONS
- extends up to 1 220 m (4,000 ft) in the Alberta Plateau Benchlands, and includes some of the lower-elevation areas within the Rocky Mountain Foothills	- characterized by an even forest canopy, punctuated by numerous vegetation openings created by fens and bogs - white spruce occurs on the mesic sites, black spruce and lodgepole pine on the drier sites, and black spruce and tamarack on very wet sites - terrain is gently-sloping or flat	- the attractiveness of this zone arises from the varied patterns of grasses and tree vegetation; these are accentuated by colour contrasts - within the wetter sites, a diversity of species, including patches of tamarack, provide vivid colour accents during the fall	- visual impacts in this zone will be low	- alignments can be located along the edges of vegetation openings to reduce the contrast of right-of-way clearing with the forest canopy, and also to open views to the subtle vegetation patterns and water features which are present

Plate 4.13.
Vegetation openings occupied by bogs and fens are typical within the Boreal white spruce forest zone.

chapter five

5 VISUAL INTERPRETATIONS FOR SELECTED TERRAIN UNITS

5.1. INTRODUCTION

Terrain units are defined on the basis of geological materials, the texture of these materials, the morphology of the land surface, and types of erosion and/or other processes which are acting on, or have in the past acted on, the land surface (ELUSC, 1978, Appendix G). They represent areas with distinct physical characteristics, and are often visually distinct also.

Interpretations have been developed for two types of terrain unit: (i) those within which silts and other lacustrine soils are presently subject to failure; and (ii) avalanche zones. These two types of unit have been selected for visual analysis because they are found extensively throughout the Study Area. They constitute areas which are particularly vulnerable to visual impacts associated with linear developments. Avalanche zones are also of interest because they frequently offer good viewing opportunities. The visual interpretations for these units are contained in Tables 5.1. and 5.2., which follow.

The locations of these two types of terrain unit within the corridor options which are examined in Chapter Seven are delineated in Figures 7.4 to 7.13. It should be noted that the composite silt and lacustrine terrain unit type was derived by grouping several of the different types of silt and lacustrine units which are delineated on the available 1:50 000-scale terrain unit mapping. (The latter was prepared for the Northeast Coal Study by the former Resource Analysis Branch).

5.2. UNSTABLE SILT AND LACUSTRINE SOILS

TABLE 5.1.

UNSTABLE SILT AND LACUSTRINE SOILS

LOCATION(S)	DESCRIPTION	VISUAL IMPACTS	DESIGN CONSIDERATIONS
- these soils blanket the valley bottoms and lower portions of valley sides in most of the east-west valleys within the Rocky Mountains Region below an elevation of 1 220 m (4,000 ft) - occur in valleys below 885 m (2,900 ft) in the McGregor Plateau and Rocky Mountain Trench regions - the most extensive lacustrine deposits within the potential transportation corridors occur within the Herrick, Framstead, Jarvis and McGregor valleys	- silt and lacustrine soils presently subject to failure, gullying, piping and/or erosion - soil is easily eroded, particularly following the removal of plant cover - light soil colour - characterized by a continuous forest cover of mixed coniferous and deciduous vegetation - the variety in vegetation and the variation in topography provide visual interest	- high visual impacts would arise from the need to maintain an even grade through uneven terrain, resulting in the creation of cut-and-fill slopes which contrast in form, colour and scale with the undisturbed landscape - the more hummocky or deeply-gullied the formation, the greater will be the impact of an alignment through it - the exposed soils, being highly erodible, increase the likelihood that impacts will be sustained over a long period of time	- minimize distance required to cross units - avoid deeply-gullied areas where possible - stabilize and revegetate cut-and-fill slopes immediately following construction - localized impacts are a relatively minor concern, particularly since the areas of fill between cut slopes provide welcome viewing opportunities - since potential corridors and forest resource roads lie along these lacustrine formations for many kilometres, it is anticipated that the repetition of the form-colour patterns imposed upon the foreground of the traveller's view will largely preclude the experience of the pre-existing landscape - viewed from a distance, an alignment would dominate the field of view

Plate 5.1.
Lower Herrick visual unit. The extensive lacustrine formations typically occur in linear zones between the floodplain and steep colluvial slopes.

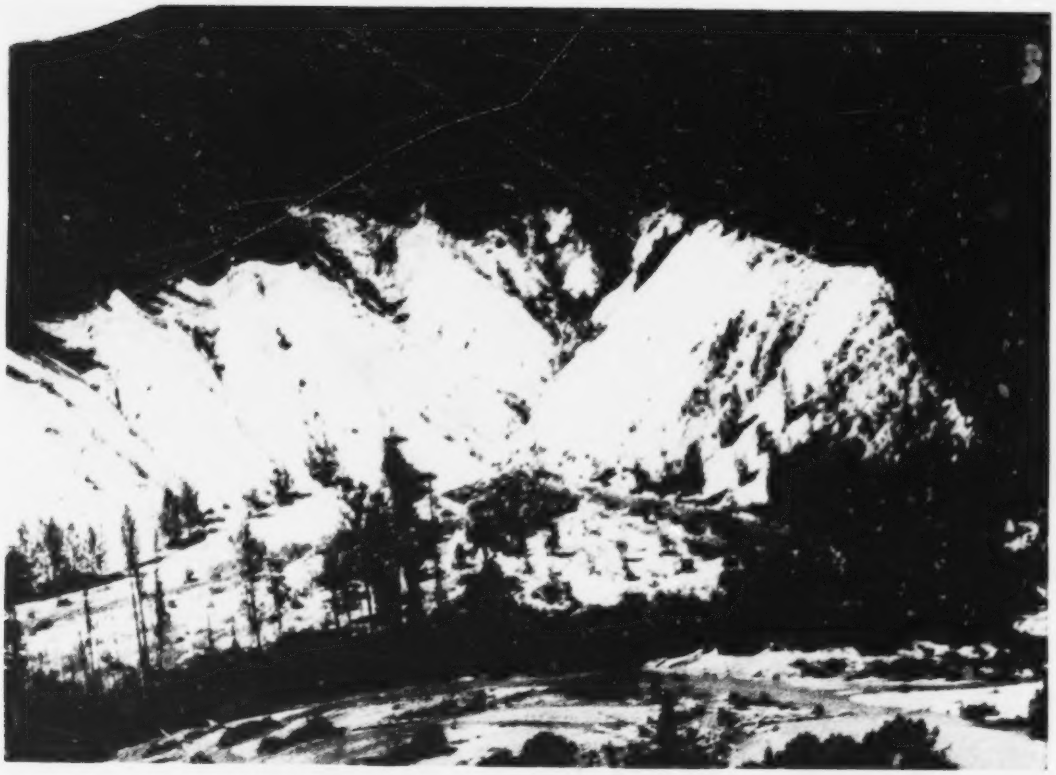


Plate 5.2.
Slope failure in a lacustrine deposit in the Spakwaniko valley.

5.3. AVALANCHE UNITS

TABLE 5.2.

AVALANCHE UNITS

UNIT LOCATION(S)	DESCRIPTION	VULNERABILITY TO VISUAL IMPACTS	ALIGNMENT DESIGN CONSIDERATIONS
- found extensively within the Rocky Mountains region and, to a lesser extent, the Rocky Mountain Trench, McGregor Plateau and the Rocky Mountain Foothills - the most extensive avalanche activity within the potential transportation corridors occurs within the Framstead, Herrick and Jarvis valleys	- seepage usually present - soils unstable - characterized by the contrast in colour of the bright green avalanche alder with the dark green coniferous forest - colourful vertical avalanche chutes provide visual variety in an otherwise uniform forest canopy - accentuates vertical landform patterns	- visual impacts occur because horizontal alignments appear as incongruous visual elements in the vertically patterned landscape - visual impacts are more visible in these units since the slide alder provides little screening - extensive structures to stabilize the slope would sometimes be required	- keep alignments as low on slopes as possible; here, views of the right-of-way will be foreshortened and alignments will be visually associated with the more horizontal landscape features of the valley bottom (e.g. streams)

Plate 5.3.
The vertical vegetation pattern is accentuated by the contrast in the colour of the seral vegetation with that of the adjacent forest cover.

chapter six

6 VISUAL UNIT INTERPRETATIONS

6.1. INTRODUCTION

It is proposed in this report that the management of the visual resources of the Study Area should be implemented primarily at the visual unit scale. For this reason, the information which is contained in the biophysical, visual quality and visual vulnerability interpretations is here consolidated and summarized for each of the defined visual units. The intent is to facilitate data retrieval on a site-specific basis. The visual units are grouped by physiographic region, a table being presented for each such region (see Tables 6.1. to 6.5.). Each regional table is prefaced by a summary statement which highlights those management considerations pertinent to the visual units in that region. Most of the visual units and scenic features which are mentioned in these summaries are located in Figure 6.1.

Within each table, the visual units are ranked according to their visual quality ranking scores, beginning at the top of each list with those with the highest scores, and progressing to units with the lowest scores. To simplify this ranking process, units have been classified into five descriptive levels of visual quality:

Visual Quality Category	Visual Quality Ranking Score
Outstanding	160 - 200
Very high	120 - 159
High	80 - 119
Moderate	40 - 79
Low	0 - 39

A double horizontal line separates each of these categories in each table.

A "P" follows a visual quality ranking score where the visual unit is considered by the author to be of special importance. Units are so designated when they form a link in a chain of major scenic units or are a major scenic climax or focus for several adjacent units. In the assessment of development proposals, the potential importance of these units as regionally significant corridors or destination points should be considered. The features which are listed in the "visually significant features" column of the tables are derived from the information which contributed to the visual quality indicator rankings for each of the visual units. The visual quality ranking forms for all visual units are presented in Appendix C of this report as background data.

The visual vulnerability ratings are derived by assessing the visual vulnerability sectors through which an alignment would most probably pass if it were to be located within a particular visual unit. Where an alignment would pass through sectors of variable vulnerability, the extent and magnitude of accumulated impacts are considered in assigning a summary ranking. The spatial quality and scale of enclosure is also considered in this assessment of visual vulnerability. In addition to the "low", "moderate" and "high" vulnerability ratings which are found on the 1:100 000-scale visual unit maps, a "very high" category has been added to indicate units where impacts would be accentuated by: (i) the location of an alignment on highly erodible soils, particularly on deeply-gullied lacustrine soils; or (ii) the scale of enclosure, since the visual impacts of an alignment on steep slopes in a narrow valley will be greater than those for an alignment located on steep slopes in a broader valley.

The forest zone and terrain unit notations represent the biophysical interpretations which are relevant to various aspects of the visual management of proposed developments within each visual unit.

6.2. SUMMARY OF INTERPRETATIONS FOR VISUAL UNITS

6.2.1. ROCKY MOUNTAIN TRENCH (see Table 6.1.)

Visual Quality

- moderate to high visual quality ratings.

Visual Vulnerability

- low to moderate visual vulnerability ratings.

Management Considerations

- the Fraser-McBride visual unit is important regionally since it is a component of the corridors which link both Edmonton and Kamloops (via the North Thompson corridor) to Prince George.

- the Fraser River is the single most important visual feature within this region.
- corridors B and C terminate in the Fraser-McBride visual unit at Dome Creek and McGregor respectively.
- since commercial development will probably occur at the junction of any new resource road with Highway #16, a development concept should be prepared which protects and enhances the visual quality of this location, whether at Dome Creek or McGregor; it should:
  - (i) provide for commercial development without indiscriminate clearing or strip development; and
  - (ii) consider aesthetic issues related to powerline placement, size and placement of signs, and lighting requirements.
- since very little public access or facility development has taken place along the Fraser River between Prince George and McBride, a river-oriented park should perhaps be considered in the vicinity of any resource road terminus along Highway #16.
- patch logging should be permitted along Highway #16 to open views towards distinctive mountain features.

TABLE 6.1.

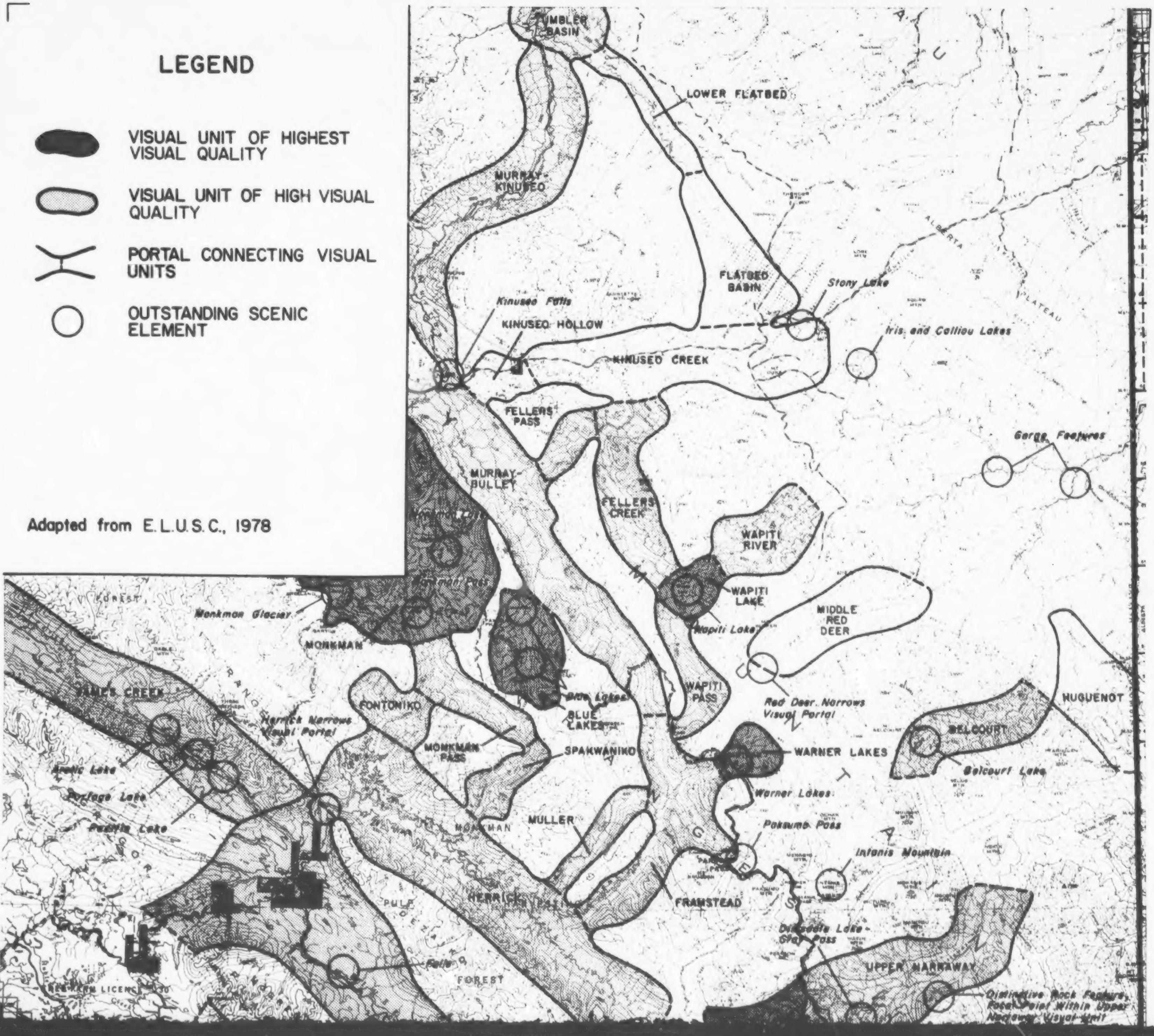
SUMMARY OF VISUAL UNIT INTERPRETATIONS - ROCKY MOUNTAIN TRENCH

VISUAL UNIT	FOREST ZONE(S)	TERRAIN UNIT(S)	VISUAL QUALITY RANKING SCORES	VISUALLY SIGNIFICANT FEATURES	VISUAL VULNERABILITY
Fraser - McBride	IwC-wS IwH-wC SAeS-alF Alpine	- no avalanche or lacustrine units	82 P*	- Fraser River, tributary streams, mountain peaks and side valleys, broad linear spatial quality	moderate
McKale	IwC-wC SAeS-alF Alpine	- avalanche units	72	- McKale River, distinctive mountain peaks, avalanche patterns	low
Fleet	SAeS-alF Alpine	- extensive avalanche units	60	- avalanche patterns, distinctive peaks, alpine areas	very high
East Twin	SAeS-alF Alpine	- extensive avalanche units	55	- avalanche patterns	very high
Humbug	IwH-wC SAeS-alF Alpine	- avalanche units	53	- avalanche patterns, distinctive peaks at headwaters	very high

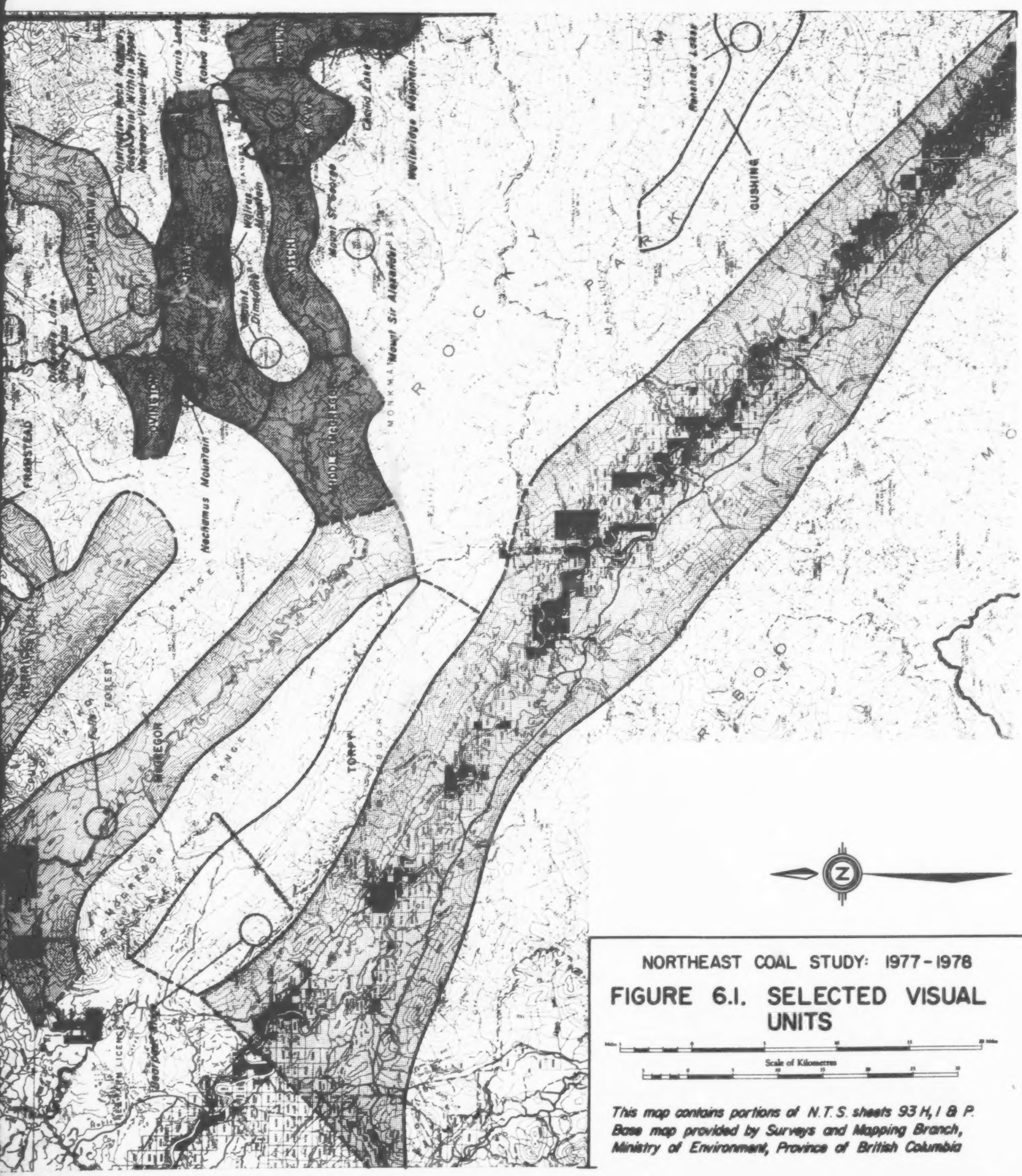
*P - indicates unit of primary importance; see text for discussion (Chapter Six, section 6.1.).

Plate 6.1.
View of the Fraser River and McBride.

Plate 6.2.
Dome Creek has a distinctly pastoral character.


LEGEND
VISUAL UNIT OF HIGHEST VISUAL QUALITY
VISUAL UNIT OF HIGH VISUAL QUALITY
PORTAL CONNECTING VISUAL UNITS
OUTSTANDING SCENIC ELEMENT
TUMBLER BASIN
LOWER FLATBED
MURRAY-KINUSEO
FLATBED BASIN
Stony Lake
Iris and Calliou Lakes
PLATEAU
ALBERTA
Kinuseo Falls
KINUSEO HOLLOW
KINUSEO CREEK
FELLERS PASS
Gorge Features
MURRAY-BULLET
FELLERS CREEK
WAPITI RIVER
WAPITI LAKE
Wapiti Lake
MIDDLE RED DEER
Monkman Glacier
MONKMAN
JAMES CREEK
FONTONIKO
Herrick Narrows Visual Portal
Blue Lakes
BLUE LAKES
WAPITI PASS
Red Deer Narrows Visual Portal
HUGUENOT
BELCOURT
Belcourt Lake
MONKMAN PASS
SPAKWANIKO
WARNER LAKES
Warner Lakes
Arctic Lake
Portage Lake
Pacific Lake
MULLER
Paksumo Pass
Intanis Mountain
HERRICK
FRAMSTEAD
PULP
FOREST
RANGE
Dissodite Lake-Gray Pass
UPPER NARRAWAY
Distinctive Rock Feature, Focal Point Within Upper Narraway Visual Unit

Adapted from E.L.U.S.C., 1978

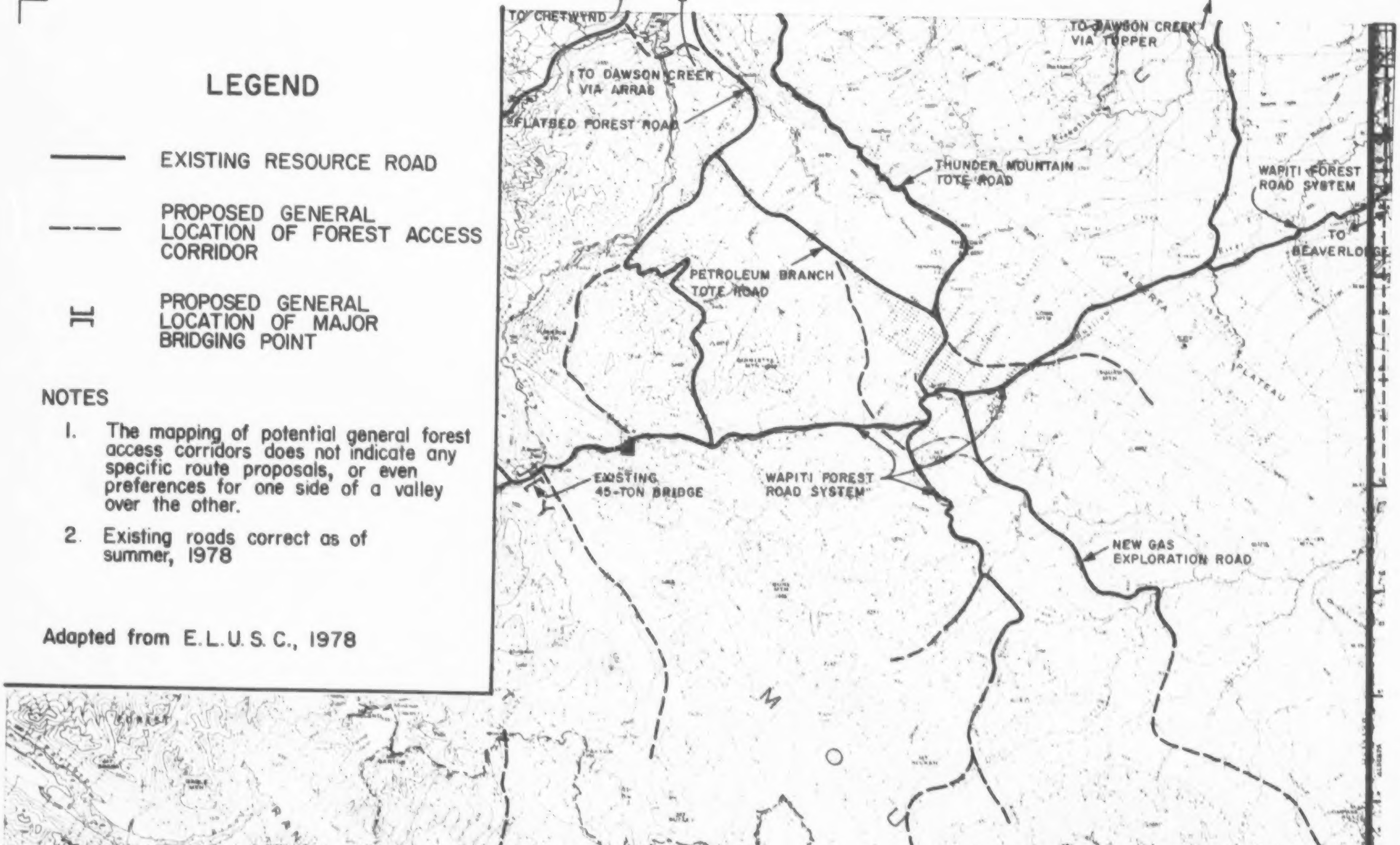

UPPER HAMBAWA
Outstanding Rock Feature, Focal Point Within Upper Narrowy Visual Unit
Jarvis Lake
Kakwa Lake
Cecilia Lake
Wallbridge Mountain
Walrus Mountain
Mount Dimsdale
Mount St. George
Mount Sir Alexander
MONKMAN
MIDDLE McGREGOR
Nechamus Mountain
FAIRSTEAD
R O C K Y
P A R K
CUSHING
RANGE
FOREST
McGREGOR
TORPY
R O B S O N

NORTHEAST COAL STUDY: 1977-1978

FIGURE 6.1. SELECTED VISUAL UNITS

Scale of Kilometres

This map contains portions of N.T.S. sheets 93 H, I & P.
Base map provided by Surveys and Mapping Branch, Ministry of Environment, Province of British Columbia


TO CHETWYND
TO DAWSON CREEK VIA ARRAS
FLATBED FOREST ROAD
TO DAWSON CREEK VIA TUPPER
THUNDER MOUNTAIN TOTE ROAD
WAPITI FOREST ROAD SYSTEM
TO BEAVERLODGE
PETROLEUM BRANCH TOTE ROAD
ALBERTA
PLATEAU
EXISTING 45-TON BRIDGE
WAPITI FOREST ROAD SYSTEM
NEW GAS EXPLORATION ROAD
WAPITI FOREST ROAD (FIRE PROTECTION ONLY)
M O U N T A I N
R A N G E S
RANGES
MONKMAN
HARVESTING
PULP
FOREST

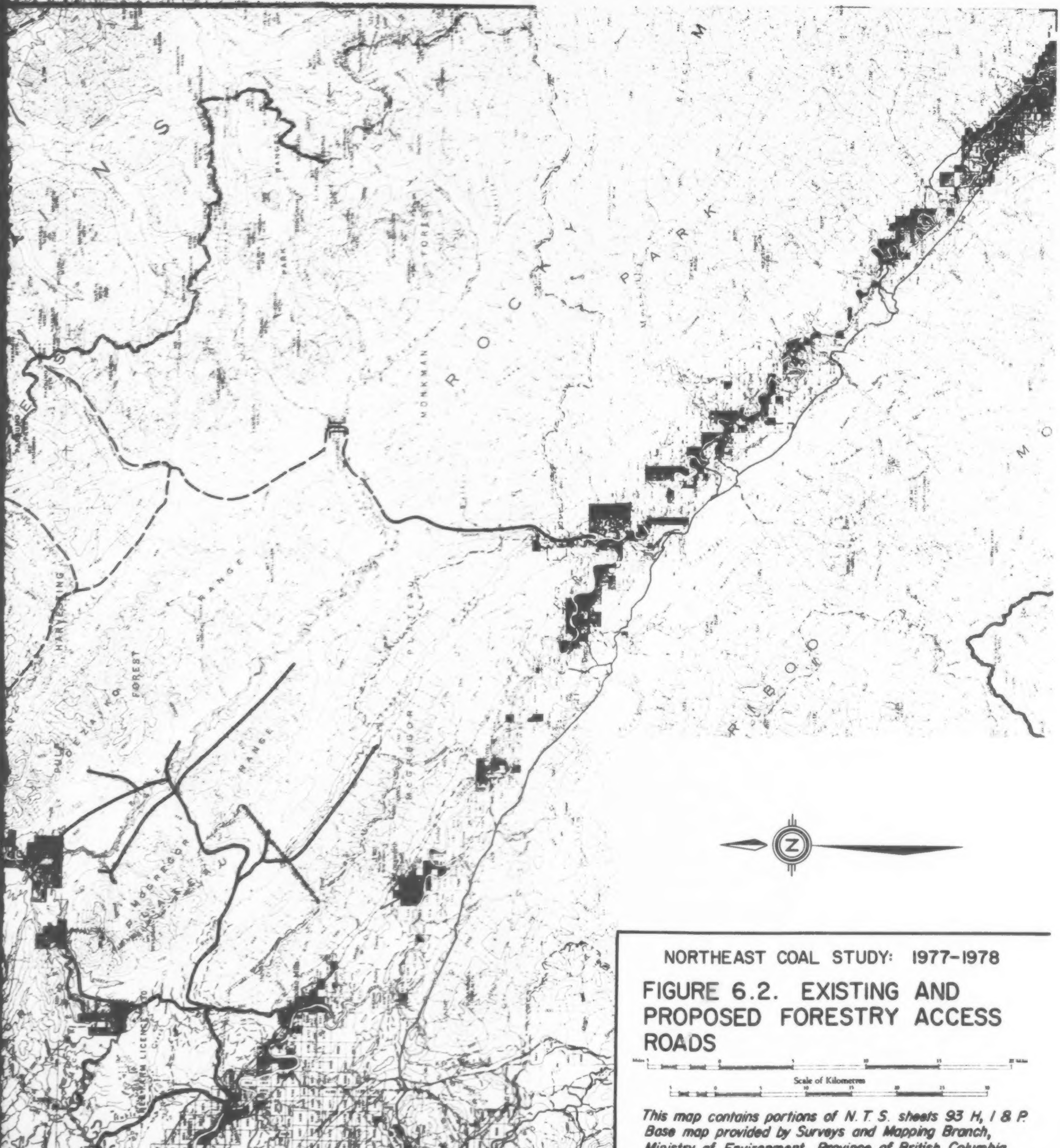
LEGEND

——	EXISTING RESOURCE ROAD
– – –	PROPOSED GENERAL LOCATION OF FOREST ACCESS CORRIDOR
][	PROPOSED GENERAL LOCATION OF MAJOR BRIDGING POINT

NOTES

1. The mapping of potential general forest access corridors does not indicate any specific route proposals, or even preferences for one side of a valley over the other.
2. Existing roads correct as of summer, 1978

Adapted from E. L. U. S. C., 1978



NORTHEAST COAL STUDY: 1977-1978

FIGURE 6.2. EXISTING AND PROPOSED FORESTRY ACCESS ROADS

Scale of Kilometres

This map contains portions of N. T. S. sheets 93 H, I & P. Base map provided by Surveys and Mapping Branch, Ministry of Environment, Province of British Columbia

TABLE 6.2.

SUMMARY OF VISUAL UNIT INTERPRETATIONS - McGREGOR PLATEAU

VISUAL UNIT	FOREST ZONE(S)	TERRAIN UNIT(S)	VISUAL QUALITY RANKING SCORES	VISUALLY SIGNIFICANT FEATURES	VISUAL VULNERABILITY
Herrick	SRwS-alF:b SAeS-alF	- extensive lacustrine unit, gullied - avalanche units	146 P	- Herrick Creek, falls, views to Rocky Mountains	very high
McGregor River	IwC-wS IwH-wC SAeS-alF	- localized lacustrine units	109 P	- McGregor River, vegetation patterns associated with wetlands, canyon and rapids	moderate
Hedrick	IwH-wC SAeS-alF Alpine	- avalanche units	108	- lakes, mountain peaks	high
Gleason	IwH-wC SAeS-alF Alpine	- avalanche units	101	- lakes, mountain peaks	high
Pass Lake	IwH-wC SAeS-alF	- no avalanche or lacustrine units	89	- lake, spatial quality	moderate
West Torpy	IwC-wS IwH-wC SAeS-alF	- no avalanche or lacustrine units	81	- linear spatial quality, falls	moderate
McGregor Rapids	SRwS-alF:a SAeS-alF	- lacustrine units	81 P	- McGregor River and rapids	low
Dezaiko	SAeS-alF Alpine	- avalanche units	80	- mountain peaks and ridges, avalanches	high
Goodson	IwC-wS IwH-wC SAeS-alF	- no avalanche or lacustrine units	76 P	- spatial quality, Goodson Creek, Walker Canyon	low
Severeid Creek	IwH-wC SAeS-alF	- no avalanche or lacustrine units	65	- spatial character	moderate
Upper Torpy	IwC-wS SAeS-alF Alpine	- no avalanche or lacustrine units	48	- vegetation patterns, mountain peaks	moderate

6.2.2. McGREGOR PLATEAU (see Table 6.2.)

Visual Quality

- moderate to very high visual quality ratings.
- the McGregor River, Pass Lake, the McGregor Rapids and the alpine area along Bearpaw Ridge are the most significant scenic features.

Visual Vulnerability

- low and moderate visual vulnerability ratings in those visual units within which corridor development is proposed, except within the Herrick Creek visual unit, where lacustrine terrain units are vulnerable to high visual impacts.

Management Considerations

- although extensive logging has taken place, impacts are presently low to moderate, largely because logging has been confined to valley bottoms where views of openings are easily screened and, when seen, are foreshortened by even terrain.

- since Corridors B and C would pass through visual units where logging is proposed, care should be taken in the design and location of further clear-cuts to minimize their impact on the proposed corridors; the locations of existing and proposed forestry access roads are plotted in Figure 6.2.
- the visual impact of clear-cuts adjacent to the road can be reduced by screening, and also by leaving patches of trees to create perspective views through openings.
- the visual impact of clear-cuts along the valley sides can be reduced by keeping the openings sufficiently small that they are visually subordinated to the landforms against which they are viewed.
- the forms of the openings should conform to the landforms against which they are viewed.
- it may be appropriate in some instances to feather the edges of clear-cuts to reduce their geometric quality.

Plate 6.3.
Logging clear-cuts on the valley bottom in the McGregor visual unit.

Plate 6.4.
Logging clear-cut on valley side in the McGregor River visual unit.

6.2.3. ROCKY MOUNTAINS (Table 6.3.)

Visual Quality

- a concentration of visual units with "outstanding" visual quality ratings is located along the Rocky Mountains Divide, including most notably the Jarvis, Kakwa, Cecilia and Ovington visual units.
- the visual qualities of these units are comparable to those of the Banff and Jasper National Parks; visual units are characterized by glacial lakes, massive mountains and peaks, glaciers, waterfalls, hanging valleys, avalanche chutes and monumental spatial qualities.
- visual quality is enhanced by the region's relatively pristine state; wilderness values are widespread and are largely unimpaired by human interventions.
- the Middle McGregor, Narraway, Warner, Paksumo, Renshaw and Cushing Creek visual units are assigned "very high" and "high" visual quality ratings.
- Dimsdale and Warner Lakes, which are located within the Narraway and Framstead visual units respectively, are also distinctive visual features.

TABLE 6.3.

SUMMARY OF VISUAL UNIT INTERPRETATIONS - ROCKY MOUNTAINS

VISUAL UNIT	FOREST ZONE(S)	TERRAIN UNIT(S)	VISUAL QUALITY RANKING SCORES	VISUALLY SIGNIFICANT FEATURES	VISUAL VULNERABILITY
Jarvis	SBwS-alF:h SAeS-alF Alpine	- avalanche units	194 P	- Jarvis Lakes, mountain peaks, glaciers, hanging valleys, waterfalls, avalanche patterns, spatial quality	very high
Kakwa	SAeS-alF Alpine	- avalanche units	164 P	- Kakwa and Babette Lakes, mountain peaks and ridges, glaciers, avalanche patterns	moderate
Cecilia	SAeS-alF Alpine	- avalanche units	160 P	- Cecilia Lake, enclosing mountain massif, open vegetation pattern, Cecilia Creek, avalanche patterns	low
Ovington	SAeS-alF Alpine	- extensive avalanche units	160 P	- monumental scale of enclosure, mountain massifs, glaciers, waterfalls, avalanche patterns	very high for proposed rail route, moderate for road
Kitchi	SAeS-alF Alpine	- extensive avalanche units	156 P	- mountain peaks and massifs, glaciers, narrow spatial enclosure, sinuous section of Kitchi Creek, avalanche patterns	very high
Middle McGregor	IwC-wS IwH-wC SAeS-alF Alpine	- avalanche units - extensive lacustrine units, gullied	154 P	- mountain massifs, glaciers, sinuous McGregor River, avalanche units, most dramatic viewscape within boundaries of the proposed corridors	very high for proposed rail route, moderate to high for road alignment
Narraway	SAeS-alF Alpine	- avalanche units	150 P	- Dimsdale Lake - Gray Pass, mountain peaks, glaciers, Narraway River, waterfalls	moderate
Framstead	SBwS-alF:b SAeS-alF Alpine	- extensive lacustrine units, deeply-gullied - extensive avalanche units	140 P	- mountain peaks, glaciers, Framstead Creek, waterfalls	very high
Warner	SAeS-alF Alpine	- extensive lacustrine units - avalanche units	138 P	- Warner Lakes, mountain peaks, glaciers, waterfalls	very high for rail alignments, moderate for road alignments
Paksumo	SAeS-alF Alpine	- extensive lacustrine units - extensive avalanche units	132 P	- lakes, mountain peaks, glaciers, tightly enclosed mountain valley, open vegetation, avalanche patterns	very high
Upper Herrick	SAeS-alF Alpine	- extensive lacustrine units - extensive avalanche units	118 P	- mountain peaks, glaciers, lake, open vegetation at Herrick Pass, avalanche patterns	high
Edgegrain	SAeS-alF Alpine	- avalanche units	113 P	- hanging valley adjacent to Jarvis valley, surrounded by mountain peaks and glaciers, waterfalls, small lakes, varied vegetation	high
Manitou	SAeS-alF Alpine	- avalanche units	107	- tightly enclosed mountain valley, mountain ridges, avalanche patterns, vegetation openings on valley floor	moderate

TABLE 6.3. (continued)

Obelisk	SAeS-alF Alpine	- avalanche units	104 P	- mountain peaks, glaciers, small lakes	moderate
Cushing	IwC-wS SAeS-alF Alpine	- extensive avalanche units	103 P	- vivid, unified U-shaped valley, distinctive spatial quality, dramatic sequence of avalanche chutes, extensive alpine area	very high
Renshaw	Alpine	- no avalanche or lacustrine units	97 P	- alpine lakes and meadow, rock features, surrounded by snow-capped mountain peaks, excellent panoramic views of the Cushing valley	low
Upper Red Deer	SAeS-alF Alpine	- avalanche units	96 P	- waterfalls and rapids at lower portal, distinctive peaks, avalanche pattern, Red Deer Creek	moderate
Upper Belcourt	SAeS-alF Alpine	- avalanche units	86	- open vegetation on valley floor, small lakes, Belcourt Creek, avalanche patterns	moderate
Moonias	SAeS-alF Alpine	- avalanche units	85	- lake, distinctive peaks, alpine	moderate
Upper McGregor	IwC-wS IwH-wC SAeS-alF Alpine	- avalanche units - lacustrine units	82 P	- side valley containing ten waterfalls, avalanche patterns, McGregor River	high
South Muinok	SAeS-alF Alpine	- no avalanche or lacustrine units	79	- distinctive mountain peaks	moderate
Whatley	SAeS-alF Alpine	- avalanche units	66	- enclosed mountain valley, avalanche pattern	high
Walker	IwH-wC SAeS-alF Alpine	- extensive avalanche units	66	- canyon and tight linear valley, avalanche patterns, distinctive mountain peaks at headwaters	very high
North Muinok	SAeS-alF Alpine	- avalanche units	63 P	- rock ridge, vegetation openings	low
Buchanan	SAeS-alF Alpine	- no avalanche or lacustrine units	62 P	- distinctive mountain peaks, lake	high
Wallop	SAeS-alF Alpine	- extensive avalanche units	62	- avalanche patterns	very high
Lower Morkill	IwC-wS IwH-wC SAeS-alF Alpine	- no avalanche or lacustrine units	53	- Morkill River	high
Upper Morkill	IwC-wS SAeS-alF Alpine	- no avalanche or lacustrine units	50	- distinctive mountain peaks in headwaters, small isolated lakes	moderate
Bastille	SAeS-alF Alpine	- no avalanche or lacustrine units	50	-	moderate
Hellroaring	SAeS-alF Alpine	- extensive avalanche units	45	- avalanche patterns	high
Forgetmenot	SAeS-alF Alpine	- no avalanche or lacustrine units	43	-	high
Idol	SAeS-alF Alpine	- no avalanche or lacustrine units	33	-	moderate
McCullagh	IwC-wS SAeS-alF	- lacustrine units - avalanche units	33	-	moderate

Visual Vulnerability

- visual vulnerability ratings are high, in recognition of the potentially great discordance of horizontal alignments located within vertically patterned landscapes.
- visual impacts are potentially very high in the Jarvis, Middle McGregor, Framstead and Upper Herrick visual units due to the presence of extensive lacustrine soil deposits.

Management Considerations

- preserve the wilderness values within the Jarvis, Kakwa, Cecilia and Ovington visual units; recreation reserves have been proposed for these areas (Sky, 1979).
- comments related to logging impacts in the McGregor Plateau (see section 6.2.2., above) also apply to this region, and particularly to the Cushing Creek visual unit.
- the Middle McGregor visual unit contains the most dramatic viewscape in the Study Area; neither logging nor corridor development should be permitted to degrade its quality.
- excellent hiking and viewing opportunities exist along the alpine ridge between Dimsdale and Kakwa Lakes, which separates the Narraway and Jarvis valleys (see Sky, 1979).
- Renshaw Lakes and surrounding alpine meadows provide a scenic terminus to a hiking trail from McBride, and offer panoramic views of the Cushing Creek visual unit.

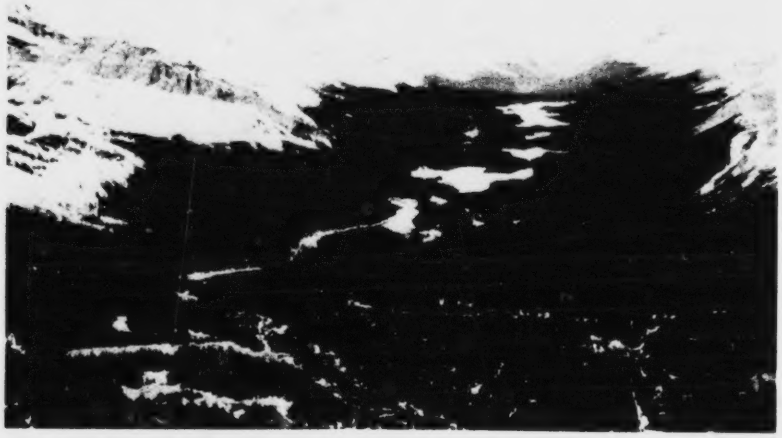


Plate 6.5.
Jarvis Lakes.

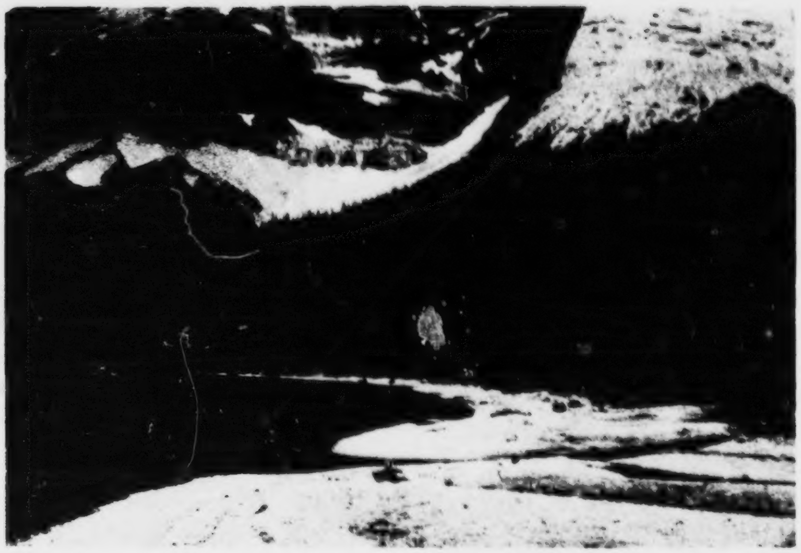


Plate 6.6.
Kakwa Lake.

Plate 6.7.
Cecilia Lake.

Plate 6.8.
Ovington visual unit.

Plate 6.9.
Renshaw Lakes.

Plate 6.10.
Alpine tarn along the Continental Divide.

6.2.4. ROCKY MOUNTAIN FOOTHILLS AND ALBERTA PLATEAU BENCHLANDS (Tables 6.4. and 6.5.)

Visual Quality

- low to high visual quality ratings.
- characterized by the changing appearances of the major rivers, and the mixed deciduous and coniferous vegetation which is associated with riverine environments.
- distinctive visual features include the Wapiti Gorge, the Belcourt Canyon, Belcourt Lake, Stony Lake, and Calliou and Iris Lakes.

Visual Vulnerability

- not highly susceptible to negative visual impacts.
- particular care should be taken where alignments cross canyons, since unstable slopes will inhibit regeneration of vegetation in disturbed areas.

TABLE 6.4.

SUMMARY OF VISUAL UNIT INTERPRETATIONS - ROCKY MOUNTAIN FOOTHILLS

VISUAL UNIT	FOREST ZONE(S)	TERRAIN UNIT(S)	VISUAL QUALITY RANKING SCORES	VISUALLY SIGNIFICANT FEATURES	VISUAL VULNERABILITY
Wapiti Gorge	SBwS-alF:b SAeS-alF	- no avalanche or lacustrine units	93	- Wapiti River, canyon, waterfall, rock face	moderate
Middle Belcourt	SAeS-alF Alpine	- avalanche units	86	- open vegetation on valley floor, Belcourt Lake and Creek, avalanche patterns	moderate to high
Mount Becker	SBwS-alF:b SAeS-alF Alpine	- avalanche units	82	- canyon, waterfalls and rapids, Mt. Becker, avalanche patterns	high
Middle Red Deer	SBwS-alF:b SAeS-alF Alpine	- avalanche units	74	- deciduous/coniferous vegetation mix on valley floor	low
Lower Red Deer	SBwS-alF:b SAeS-alF	- no avalanche or lacustrine units	67	- riverine environment characterized by a varying degree of enclosure and a diversity of coniferous and deciduous vegetation species	low to high
Lower Wapiti	BwS SAeS-alF	- no avalanche or lacustrine units	58	- canyon, open and mixed vegetation	high
Torrens	SBwS-alF:b Alpine	- no avalanche or lacustrine units	58	- enclosed valley, distinctive ridges and alpine areas	high
Porcupine	SAeS-alF	- no avalanche or lacustrine units	56	- vegetation openings on valley floor	low
Huguenot	BwS SAeS-alF	- no avalanche or lacustrine units	55	- open vegetation patterns, wildlife viewing	low
Calliou	SAeS-alF	- no avalanche or lacustrine units	55	- lakes, and open and mixed vegetation	low
Lower Belcourt	BwS SAeS-alF	- no avalanche or lacustrine units	50	- canyon, falls, open and mixed vegetation	moderate
Lower Little Prairie	BwS SAeS-alF	- no avalanche or lacustrine units	50	- canyon, falls	low
Esker	BwS SAeS-alF	- no avalanche or lacustrine units	50	- enclosed riverine environments, open and mixed vegetation	moderate
Saxon	SAeS-alF	- no avalanche or lacustrine units	49	- mixed vegetation, distinct mountain peaks and ridges	low
Winfrey	SAeS-alF Alpine	- avalanche units	47	- avalanche patterns	high
Upper Esker	SAeS-alF	- no avalanche or lacustrine units	41	-	low
Wapiti Ridge	SAeS-alF	- no avalanche or lacustrine units	41	- varied riverine environment	-
Ptarmigan	SAeS-alF	- no avalanche or lacustrine units	41	- open and mixed vegetation, access to attractive alpine areas	low
Hanington	SAeS-alF	- no avalanche or lacustrine units	39	-	high
Holtslander	SAeS-alF Alpine	- no avalanche or lacustrine units	30	- avalanche patterns	high
Boudoir	SAeS-alF Alpine	- no avalanche or lacustrine units	28	- avalanche patterns	high
Upper Little Prairie	SAeS-alF	- no avalanche or lacustrine units	27	- open and mixed deciduous and coniferous vegetation	low
Flume	SAeS-alF	- no avalanche or lacustrine units	23	- open and mixed vegetation, access to attractive alpine areas	low

Management Considerations

- visual impacts will be unavoidably high in the minesite development areas within the Rocky Mountain Foothills; priority should be given to highway route alignments which orient the traveller to those attractive features of the region which will not likely be impacted by minesite development.
- minimize site disturbance in areas with unstable slopes, and stabilize disturbed areas immediately after construction.
- Stony Lake and its immediate hinterland lie at the junction of two resource roads; route alignments should be set well back from the lake shore in order to protect its recreation values, for which there will be an increasing demand (see Figure 7.5.).

TABLE 6.5.

SUMMARY OF VISUAL UNIT INTERPRETATIONS - ALBERTA PLATEAU BENCHLANDS

VISUAL UNIT	FOREST ZONE(S)	TERRAIN UNIT(S)	VISUAL QUALITY RANKING SCORES	VISUALLY SIGNIFICANT FEATURES	VISUAL VULNERABILITY
Old Wives	RwS	- no avalanche or lacustrine units	52	- canyon, open and mixed vegetation	moderate
Mistanusk	RwS	- no avalanche or lacustrine units	29	- open vegetation	low
Red Willow	RwS	- no avalanche or lacustrine units	25	- open and mixed coniferous/ deciduous vegetation	low

- endhaul rather than side-cast construction waste materials in the Flatbed Creek valley to minimize destruction of that vegetation which screens views from the valley bottom and the Tumbler Ridge townsite.
- highways approaching any new townsite in the Saxon Ridge area should be aligned to offer views of distinctive landscape features which will serve as community landmarks, and which will also provide visual interest in an area likely to be visually dominated by open-pit mining and industrial facilities (see Figure 7.7.).
- highway and railway alignments should be separated, particularly where they approach the townsite, to reduce exposure of travellers to industrial activity.

6.3. SUMMARY OF VISUAL IMPACT MITIGATION MEASURES

Impact mitigation measures are variously noted in the forest zone interpretations, the terrain unit interpretations and the summarized visual unit interpretations. The major types of visual impact mitigation measures are summarized below, and are focussed chiefly on linear developmental impacts, especially those which are associated with highways:

1. Follow contours with route alignments to conform with landform patterns; borders between visual vulnerability sectors usually indicate distinctive changes in slope; these appear as linear edges in the landscape; a highway alignment which follows a contour along such an edge will appear to "fit" the landscape.
2. Design highways to take advantage of natural clearings so as to open views and also to reduce the contrast of the right-of-way clearing with the continuous tree canopy of enclosed forests.
3. Patch-log so as to open views from highways to distinctive landscape features.
4. Locate alignments as low on slopes as possible; this reduces their visibility when viewed from valley bottom locations.

Plate 6.11.
B.C. Forest Service ranger station at Stony Lake.

5. Locate alignments away from those scenic features for which a more extensive form of utilization of visual and recreation values is desirable.
6. Minimize site disturbances in areas where regeneration of vegetation is likely to be very slow, e.g. within alpine, canyon and marshy areas.
7. Revegetate sensitive areas after construction activities are completed.
8. Endhaul rather than side-cast construction waste on steep slopes; this is important where vegetation on lower slopes screens views from other use areas.
9. Portals are areas of visual transition, and are often focal points or areas of increased visual interest; care should be taken to minimize disturbance in these areas.
10. Leave vegetation and landform buffer strips and curve access roads to screen views from highways into gravel pits; stockpile topsoil for reclamation of these pits after use.

Plate 6.12.
Mount Carr-Hilton in the Narraway visual unit.

chapter seven

7 VISUAL EVALUATION OF PROPOSED TRANSPORTATION CORRIDORS

7.1. SELECTION OF CORRIDOR ALTERNATIVES

A complex network of potential corridors was investigated by the ELUSC during the 1977-78 field program. From this network, ten specific corridor options have been identified for detailed evaluation. They have been selected for study on the basis that they provide access to a potential new townsite location near Saxon Ridge from either: (A) the proposed townsite at Tumbler Ridge (to the north); or (B) Dome Creek, along Highway #16 in the Fraser valley; or (C) McGregor, also along Highway #16 in the Fraser Valley (see Figure 7.1.).

7.2. PROCEDURE FOR CORRIDOR AND ROUTE EVALUATION

Although ten corridor options, corridors A, B1 to B5, and C1 to C4, have been identified, there are essentially two strategic corridor choices. The first is corridor A, which avoids a crossing of the Rocky Mountains, and links a townsite at Saxon Ridge with the Tumbler Ridge townsite. The second, which includes corridors B1 to B5 and C1 to C4, crosses the Rocky Mountains and connects with Highway #16 and the C.N. Railway at either Dome Creek (corridors B1 to B5) or McGregor (corridors C1 to C4).

Since these two strategic options pass through landscapes with vastly different terrain and vegetation characteristics, they are evaluated separately in this chapter. Firstly, corridor A is evaluated on the basis of its inherent visual characteristics. A comparative visual evaluation has been completed for the three rail and two road routes which were identified within it by ELUSC (1978).

Secondly, a joint evaluation of corridors B1 to B5 and C1 to C4 is presented. Individual corridor options have been subdivided into segments (see Figure 7.2.). Segments from different corridor options which pass through the same physiographic region are then directly compared, since they can be envisaged as accomplishing a corresponding purpose in linking origin and destination points within the different corridors. A summary corridor impact ranking is then proposed, based upon a summation of impacts within the segments comprising each corridor option.

The comparative evaluation of the corridors, route alignments and corridor segments has been undertaken with reference to the visual quality of the visual units through which they pass, the vulnerability of these units to negative visual impacts and, in the case of highways, to the available viewing opportunities. The impacts of proposed routes on visually distinct features, such as lakes or unique landforms, particularly those with a high recreation capability (as noted in Sky, 1979), are also considered.

Generally, priority is given to the protection of landscapes with the highest visual quality ratings. For railway alignments, those routes having the lowest visual quality ratings are preferred, whereas highways may be recommended within areas of "very high" or "outstanding" visual quality when access can be achieved without significantly diminishing scenic values.

7.3. CORRIDOR A (TUMBLER RIDGE TO SAXON RIDGE)

7.3.1. DESCRIPTION

Corridor A lies within the lower-elevation areas of the Rocky Mountain Foothills and the Alberta Plateau Benchlands. It is characterized by gently sloping and undulating topography which is aligned in a northwest-southeast direction, parallel to the various route alignment options which were proposed in ELUSC (1978). The vegetation cover varies from a pattern of fens, bogs and open forest in the low, wet areas to a more even forest cover on the undulating upland topography.

The visual quality ratings within this corridor are low relative to those elsewhere in the Study Area due to the subdued terrain. However, as the visual quality indicator evaluations reveal, areas of high visual quality exist along the river valleys. These high visual quality ratings arise from the changing character of the rivers as they become progressively more entrenched within their valley floors, and also from the diversity of vegetation patterns and vegetation types which are associated with them.

The visual vulnerability ratings for the landscapes within this corridor are also low. This is again attributable to the gently-sloping topography and the varied vegetation patterns, which reduce both the visibility of the right-of-way clearing and the contrast of the right-of-way clearing with the existing forest cover. Areas with high visual vulnerability ratings, however, exist along the steep river banks.

In general, corridor A is suitable for both highway and rail route development from the standpoint of potential visual impacts.

7.3.2. ROUTE EVALUATIONS

Three rail routes and two highway routes have been identified for evaluation within this corridor. These are the "Foothills", "Wapiti" and "Benchlands" rail routes and the "Foothills" and "Direct" highway routes. These alignments are evaluated here on the basis of the same criteria which were used for the corridor analysis, i.e. visual quality and visual vulnerability ratings, opportunities for viewing, and impacts on scenic features. Figure 7.3. indicates the locations of the potential road and rail alignments in Corridor A. More detailed mapping of Corridor A is presented in Figures 7.4. to 7.7., and site-specific comments on visual concerns are keyed to locations plotted on these maps. The visual analysis of the five route alignments is summarized in Tables 7.1. and 7.2.

a) Corridor A Rail Route Evaluation

On the basis of a visual evaluation of the three rail route options, they are ranked in the following order of preference:

Benchlands route - most preferred
Foothills route - intermediate choice
Wapiti route - least preferred

The Benchlands route is preferred since it is likely to be associated with low visual impacts, with the possible exception of the crossing of the Wapiti Gorge. Impacts can be largely neutralized by minimizing site disturbance during construction, and by revegetating the disturbed areas at project completion. The Foothills route would have moderate visual impacts due to its location on slightly steeper slopes and its proximity to both the Wapiti River and Red Deer Creek. The Wapiti route is the least desired route since severe and widespread visual impacts are anticipated along the Wapiti River.

The relative ranking of the Benchlands and Foothills rail routes is complicated by the uncertainty surrounding the location of potential coal washing plants and spur rail lines. If a coal washing plant is to be located along either the Wapiti River or Red Deer Creek, rather than along the Narraway River, then it may be more appropriate to locate the railway along the Foothills

TABLE 7.1.

CORRIDOR A RAIL ROUTE COMPARISON

RAIL ROUTE	LOCATION	VISUAL QUALITY	VISUAL VULNERABILITY	IMPACT ON SCENIC FEATURES
Foothills	- eastern margins of the Rocky Mountain Foothills - 176 kilometres (109 miles) in length - see Figures 7.3. to 7.6.	- lies within visual units of low and moderate visual quality	- lies primarily within areas having low visual vulnerability ratings - crosses visually prominent slopes with high visual vulnerability ratings, and which define the portals between the Middle and Lower Red Deer visual units, and the Upper Esker and Esker visual units (see Figure 7.6.) - parallels Red Deer Creek, Little Prairie Creek and the Wapiti River	- follows along the steep banks of Flatbed Creek; this section along Flatbed Creek is common to all three rail routes; visual impacts will be high in this area since route encroaches on the visually vulnerable creek setting
Wapiti	- lies along the Wapiti River - 174 kilometres (108 miles) in length	- lies within units of moderate and high visual quality	- lies within areas of low and moderate visual vulnerability between Red Deer and Belcourt Creeks - crosses slopes which form the primary enclosure of Belcourt Creek at its confluence with Huguenot Creek; these slopes have high visual vulnerability ratings and are subject to failure, increasing the likelihood of sustained visual impacts due to slow vegetation regeneration rates	- lies along the slopes which form the primary enclosure of the Wapiti River; these slopes have a high visual vulnerability rating due to their steep gradients and even forest cover; their vulnerability to impact is further heightened since revegetation will be inhibited due to the erodible nature of the soils; the alignment parallels the river for nineteen kilometres (twelve miles)
Benchlands	- eastern edge of the Rocky Mountain Foothills region - 150 kilometres (93 miles) in length	- lies within units of low, moderate and high visual quality	- lies, for the most part, in areas with moderate visual vulnerability ratings	- has the least impact on Stony Lake since a switchback on the northern slopes of Yoho Mountain is not necessary - crosses the highly scenic Wapiti Gorge with a high-level bridge crossing; since the soils are subject to failure, impacts would likely be high, although localized; construction techniques sensitive to the soil and bedrock conditions, coupled with a slope stabilization and revegetation program, would reduce impacts in this area

route in order to avoid the visual impacts associated with the development of rail spurs from either of these two valleys to either the Benchlands or Wapiti route options.

b) Corridor A Highway Route Evaluation

The Direct route is the preferred alignment, being well fitted to the landscape. Furthermore, good views of localized features, notably of the Wapiti and Red Deer Canyons and the Huguenot valley, are available along the route. Access could also be provided to these features.

TABLE 7.2.

CORRIDOR A HIGHWAY ROUTE COMPARISON

ROAD ROUTE	LOCATION	VISUAL QUALITY	VISUAL VULNERABILITY	ACCESS TO, AND IMPACT ON, SCENIC FEATURES
Direct	- central area of Foothills region - see Figures 7.3. to 7.6. - 118 kilometres (73 miles) in length	- moderate	- low to moderate	- provides access to scenic and recreationally significant features, i.e. the Wapiti Canyon and Red Deer Creek - minimal visual contact with mining activities
Foothills	- western side of Foothills region - follows Foothills rail route for much of its length - 126 kilometres (78 miles) in length	- moderate	- low to high	- provides access close to Wapiti Lake - provides access to Red Deer Creek at a point where it will likely be dominated by industrial activity

The visual impact of the Foothills route, although moderate, is higher than that of the Direct route. Moreover, viewing opportunities and access to scenic features are scarce. The most significant visual difference between the two routes, however, is related to the different perspectives of the region which are conveyed to the traveller. The Direct route, by minimizing visual contact with the mining activities and by providing access to scenic and recreationally significant features, would enhance the opportunity to experience the pre-existing or unaltered landscape. The Foothills alignment, in contrast, would expose the traveller to both the minesites and the ancillary industrial developments which will be associated with them (particularly if the Foothills rail alignment is constructed), thereby maximizing the traveller's awareness of the visual and ecological impacts of these activities on the landscape. Since the road will serve to access the region south of the proposed Tumbler Ridge townsite, it is felt that it should orient the user to the natural, unaltered landscape, or at least that it should provide a neutral experience, not one which is dominated by industrial activity.

It is worthwhile to note that a highway in Corridor A would ultimately provide access to Kakwa, Jarvis and Cecilia Lakes, all of which have outstanding visual quality ratings. They are probably the most significant recreational features within the Study Area. When access to these lakes is provided, they will likely become a major recreational focus for people from both Prince George and Dawson Creek (see Sky, 1979).

7.4. COMPARISON OF CORRIDOR OPTIONS B (DOME CREEK TO SAXON RIDGE) AND C (McGREGOR TO SAXON RIDGE)

To facilitate the comparison of corridors B and C, the nine individual corridor options have been subdivided into segments. These have been demarcated so that they correspond with both visual unit and physiographic region boundaries. Each segment within any one corridor option is compared with the segments which provide access through the same physiographic region within each of the other corridor options. The corridor options are ranked overall on the basis of a cumulative analysis of the individual segments which comprise them.

Figure 7.2. illustrates the subdivision of the nine corridor options into segments. It should be noted that, for the purpose of this analysis, the Rocky Mountains physiographic region is considered to consist of two main sub-regions, separated along the Continental Divide. The corridor segments to the east and west of the Divide respectively are analyzed as separate groups.

TABLE 7.3.

COMPARISON OF CORRIDOR SEGMENTS WHICH TRAVERSE THE ROCKY MOUNTAIN FOOTHILLS REGION

SEGMENT	VISUAL UNITS	VISUAL QUALITY/VIEWING	VISUAL VULNERABILITY	ACCESS TO, AND IMPACT ON, SCENIC FEATURES
#1.	- Middle Red Deer - Mount Becker	- comprised of visual units with moderately high and high visual quality ratings - exposes traveller to open-pit mining and associated industrial development	- moderate	- falls and rock features which form the portal between the Mount Becker and Upper Red Deer visual units will likely be degraded by the extensive engineering works which will be required to by-pass this area
#2.	- Narraway - South Muinok	- comprised of visual units with moderate and high visual quality ratings	- moderate	-

PREFERENCE - Segment #2 is preferred since it does not contain scenic features. Furthermore, it would provide access to the townsite area and ultimately to Kakwa, Jarvis and Cecilia Lakes, without first exposing the traveller to the extensive open-pit mining which will likely occur in the Red Deer valley.

TABLE 7.4.

COMPARISON OF CORRIDOR SEGMENTS WHICH TRAVERSE THE EASTERN PORTION OF THE ROCKY MOUNTAINS REGION

SEGMENT	VISUAL UNITS	VISUAL QUALITY/VIEWING	VISUAL VULNERABILITY	ACCESS TO, AND IMPACT ON, SCENIC FEATURES
#3.	- Upper Red Deer	- high visual quality - good viewing of scenic mountain features	- moderate	-
#4.	- Westernmost visibility sector of the Narraway visual unit	- very high visual quality - good viewing of scenic mountain features	- moderate	- a road route would provide access to Dimsdale Lake and Gray Pass; impacts would be moderate - rail impacts on these features would be high
#5.	- Haninaton	- low	- high	-

PREFERENCE - Segment #3 is preferred, with segment #4 the intermediate choice, and segment #5 least preferred.

TABLE 7.5.

COMPARISON OF CORRIDOR SEGMENTS WHICH TRAVERSE THE WESTERN PORTION OF THE ROCKY MOUNTAINS REGION

SEGMENT	VISUAL UNITS	VISUAL QUALITY/VIEWING	VISUAL VULNERABILITY	ACCESS TO, AND IMPACT ON, SCENIC FEATURES
#6.	- Framstead - Warner Lakes	- very high visual quality	- very high - extensive lacustrine units, deeply-gullied - extensive avalanche units	- a road route would provide access to Warner Lakes; impacts would be moderate - a rail route would have high visual impacts on Warner Lakes
#7.	- Upper Herrick - Paksumo - a rail route through Herrick Pass would also extend into the Ovington visual unit	- high visual quality - very high in Ovington visual unit	- high - extensive lacustrine units, gullied - avalanche units	- Paksumo or Herrick Passes would be accessed by a road route; impacts would be high in Paksumo Pass and moderate in Herrick Pass for both road and rail - road access is provided in close proximity to the Ovington valley - a rail route extending into the Ovington visual unit would have very high visual impact
#8.	- Jarvis	- outstanding visual quality - excellent viewing opportunities	- very high - extensive lacustrine units - extensive avalanche units	- a road route would provide access to Jarvis Lakes; impact would be moderate on Jarvis Lakes and very high on the Jarvis visual unit generally - a rail route would have very high impact on both the Jarvis Lakes and the Jarvis unit generally

PREFERENCE - For highway development, segment #7 is preferred, with segment #6 being the intermediate choice, and segment #8 being considered unsuitable for any form of transportation development. Segment #6 is preferred over segment #7 for railway development. In the opinion of the author, priority should be placed upon the preservation of the Ovington visual unit - a unit of immense scale and grandeur - at the expense of the Warner Lakes area, if such a choice cannot be avoided. Impacts from rail development would be less in the Warner Lakes area than in the Ovington valley.

TABLE 7.6.

COMPARISON OF CORRIDOR SEGMENTS WHICH TRAVERSE THE McGREGOR PLATEAU REGION

SEGMENT	VISUAL UNITS	VISUAL QUALITY/VIEWING	VISUAL VULNERABILITY	ACCESS TO, AND IMPACT ON, SCENIC FEATURES
# 9.	- Herrick Creek - McGregor River - McGregor Rapids	- moderate and high visual quality	- very high - extensive, deeply-gullied lacustrine deposits	- mountain slope and river feature which forms the portal between the Herrick and McGregor River visual units will be highly impacted by either road or railway alignments
#10.	- Middle McGregor - Goodman - a railway would extend into segment #8	- moderate and very high visual quality - excellent viewing opportunities	- very high - extensive lacustrine deposits	- the Mount Dimsdale/Mount Sir Alexander mountain glacier complex would be highly impacted by any railway alignment which extended into the highly scenic and visually vulnerable Jarvis segment #8, occupying the lower slopes of this outstanding viewscape

PREFERENCE - Segment #10 is preferred for a road alignment. Segment #9 is preferred for a rail alignment.

The comments in Tables 7.3. to 7.6. (which follow) summarize both the information presented on the 1:100 000-scale visual inventory maps and the more detailed site-specific interpretations which are noted on the corridor segment maps (Figures 7.7. to 7.13.). The 1:100 000-scale visual inventory maps are available from the Assessment and Planning Division Library.

Table 7.7. summarizes the order of preference for each corridor segment within its respective physiographic region.

TABLE 7.7.

CORRIDOR SEGMENT RANKING

Preference	McGregor Plateau	Rocky Mountains West Side	Rocky Mountains East Side	Rocky Mountain Foothills
First	#10	#7	#3	#2
Second	# 9	#6	#4	#1
Third		#8	#5	

7.5. RANKING OF CORRIDOR OPTIONS B AND C

7.5.1. HIGHWAY ALIGNMENTS

The corridor options for a highway route across the Rocky Mountains are ranked in Table 7.8. on the basis of the above evaluation of the individual segments which comprise them. It should be noted that for each highway corridor option, the component segments are listed from left (west) to right (east). Thus, for example, the most preferred highway corridor option, B3, comprises segments #10, #9, #7, #3 and #2. The least preferred option, corridor B5, contains segments #10, #8, #5 and #2. Note also that, in the ranking of corridor C4 over corridor C3, the advantage of reduced visual impact in segment #7 over segment #6 is considered to have been offset by more extensive impacts in segments #9 and #3.

TABLE 7.8.

HIGHWAY ALIGNMENT RANKING FOR CORRIDORS B AND C

Preference	Corridor	McGregor Plateau	Rocky Mountains West Side	Rocky Mountains East Side	Rocky Mountain Foothills
First	B3	#10	#9,7	#3	#2
Second	B2	#10	#9,7	#3	#1
Third	B1	#10	#9,6	#3	#1
Fourth	C2	# 9	#7	#3	#2
Fifth	C4	# 9	#6	#3	#2
Sixth	C1	# 9	#6	#3	#1
Seventh	C3	# 9	#7	#3	#1
Eighth	B4	#10	#8	#4	#2
Ninth	B5	#10	#8	#5	#2

7.5.2. RAILWAY ALIGNMENTS

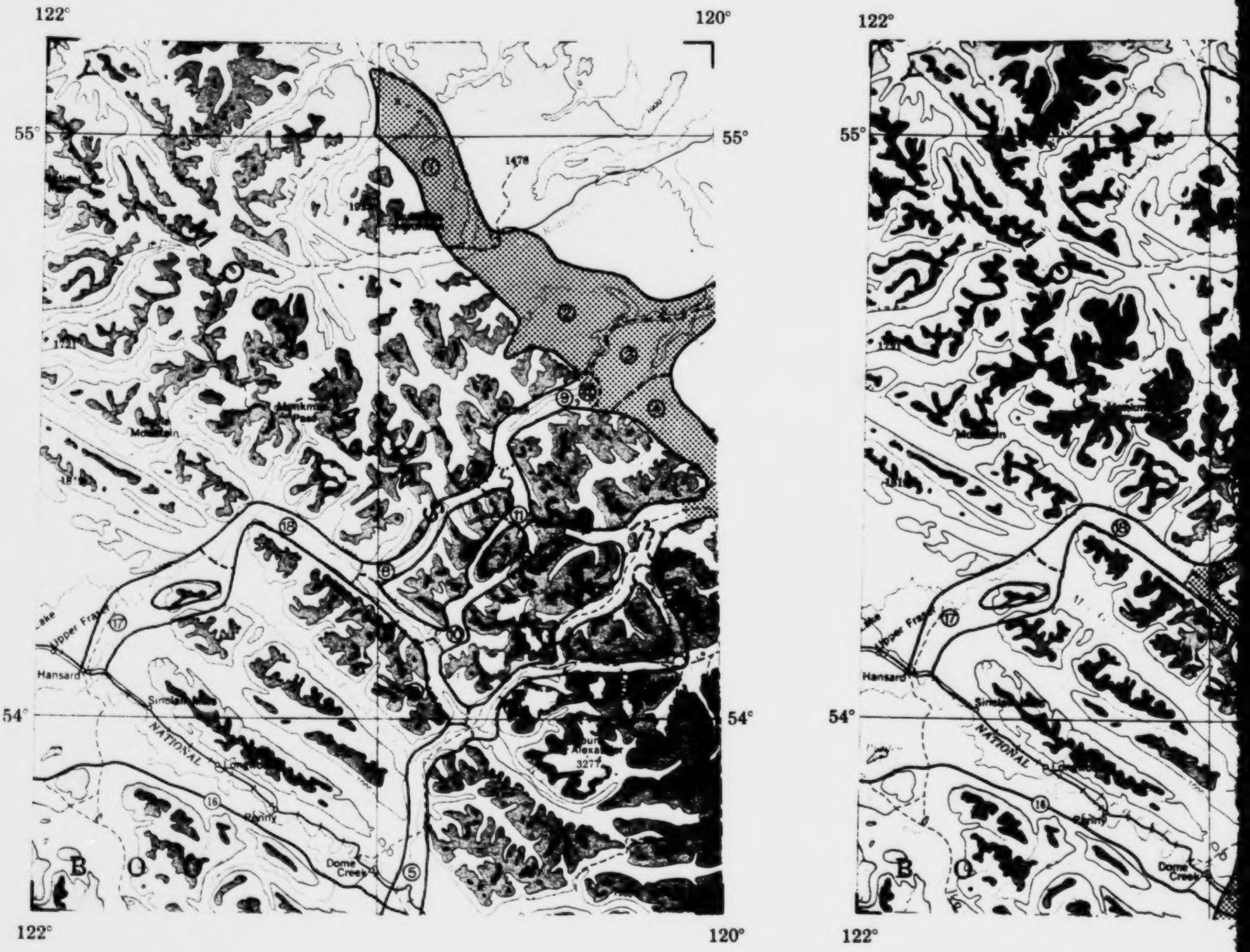
Rail alignments within corridors B and C have not been formally proposed. However, two routes which are theoretically possible in terms of grade constraints have been projected in order to facilitate a preliminary comparison of corridor options (see Figure 7.3.).

As was noted during the evaluation of the individual corridor segments, the most severe impacts from railway development are anticipated in the Framstead, Paksumo, and Herrick Passes, in the Ovington visual unit, along lower portions of the Jarvis segment, and at the portal between the Herrick and McGregor visual units. Of these impacts, those in the Ovington visual unit (segments #9, overlapping #7) and the Jarvis segment (#8) are expected to be most severe. Both segments have outstanding visual quality ratings, and are highly vulnerable to negative visual impacts. It is recommended, therefore, that no railway development be undertaken in these areas. A rail alignment within Corridor B, passing through segments #1, #3, #6, #9 and #10, although not a desirable route from a visual point of view, would entail less negative visual impact than an alignment passing through segments #1, #3, #7, #9 and #10, and possibly looping into segment #8 to maintain grade.

7.6. SUMMARY COMPARISON OF CORRIDOR OPTIONS A, B AND C

Corridor A is clearly preferred for both road and rail development. Rail routes through corridors B and C should be avoided, if at all possible. A road route through corridors B4 or B5 would be totally unacceptable from a visual standpoint, since there would be major unavoidable impacts on segment #8, which has the highest visual quality ratings of any potential corridor within the entire Northeast Coal Block.

FIGURE 7.1 TRANSPORT CORRIDOR OPTIONS


122°
120°
55°
54°
1476
Monkman Pass
Mountain
Upper Fraser
Hansard
Sinclair Mills
NATIONAL
Longworth
Penny
Dome Creek
Mount Alexander
3277
B
O
122°
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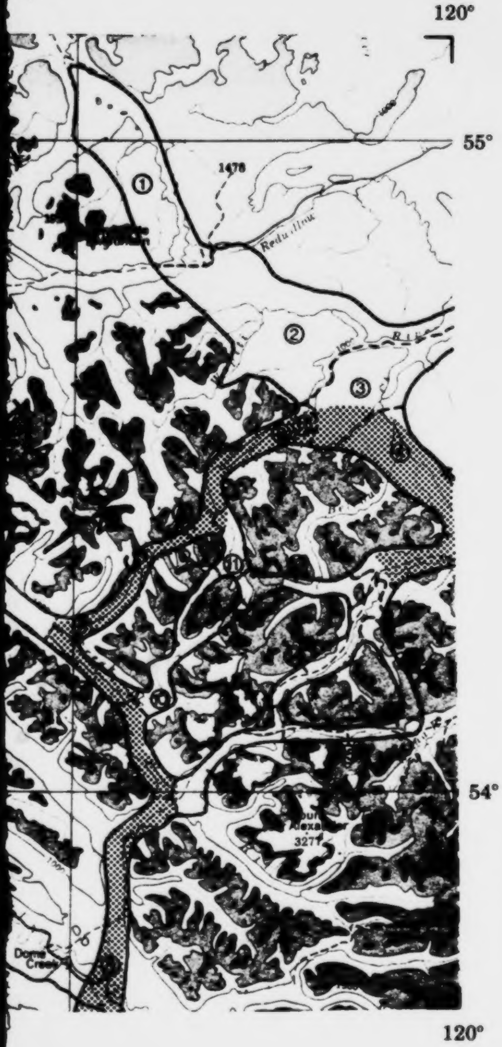
54°
Hansard
Dome Creek

A. TUMBLER RIDGE TO SAXON RIDGE

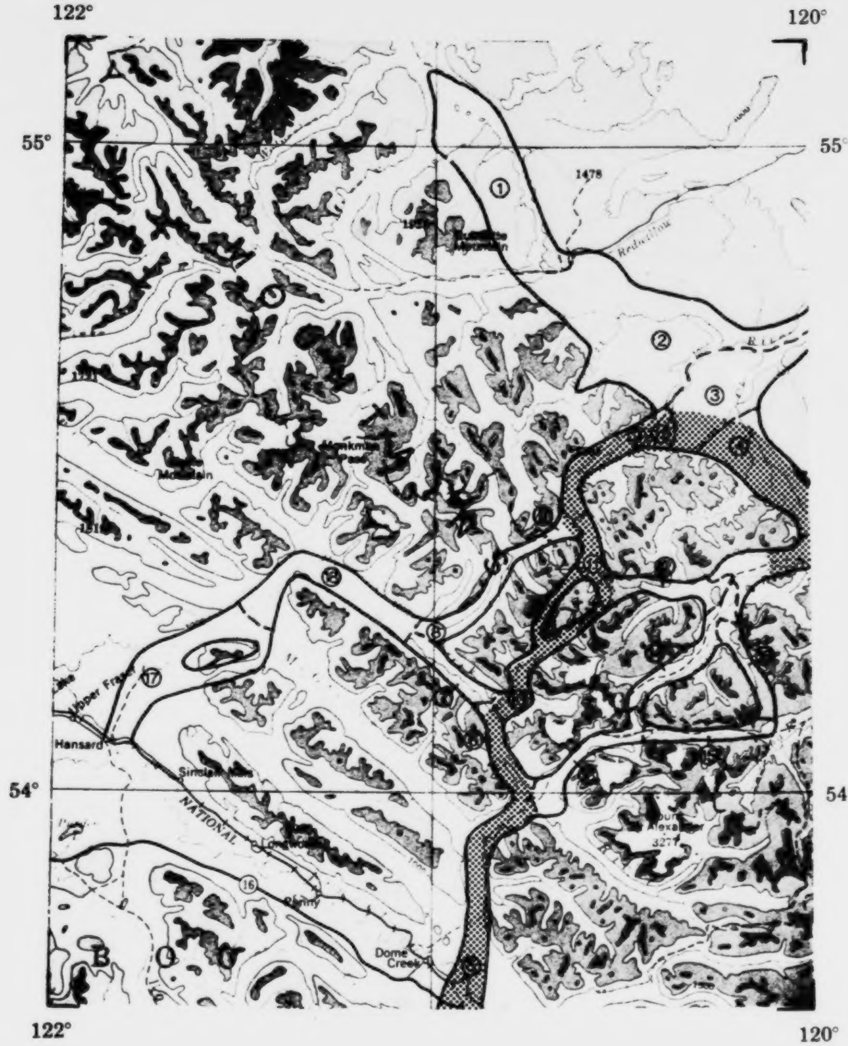
BI. DOME CREEK T

via the Goodson, McGreg
and Framstead Valleys, F
Red Deer and Huguenot V


120°
55°
1478
①
②
③
Redwillow
54°
3277
Dome Creek
120°

EEK TO SAXON RIDGE

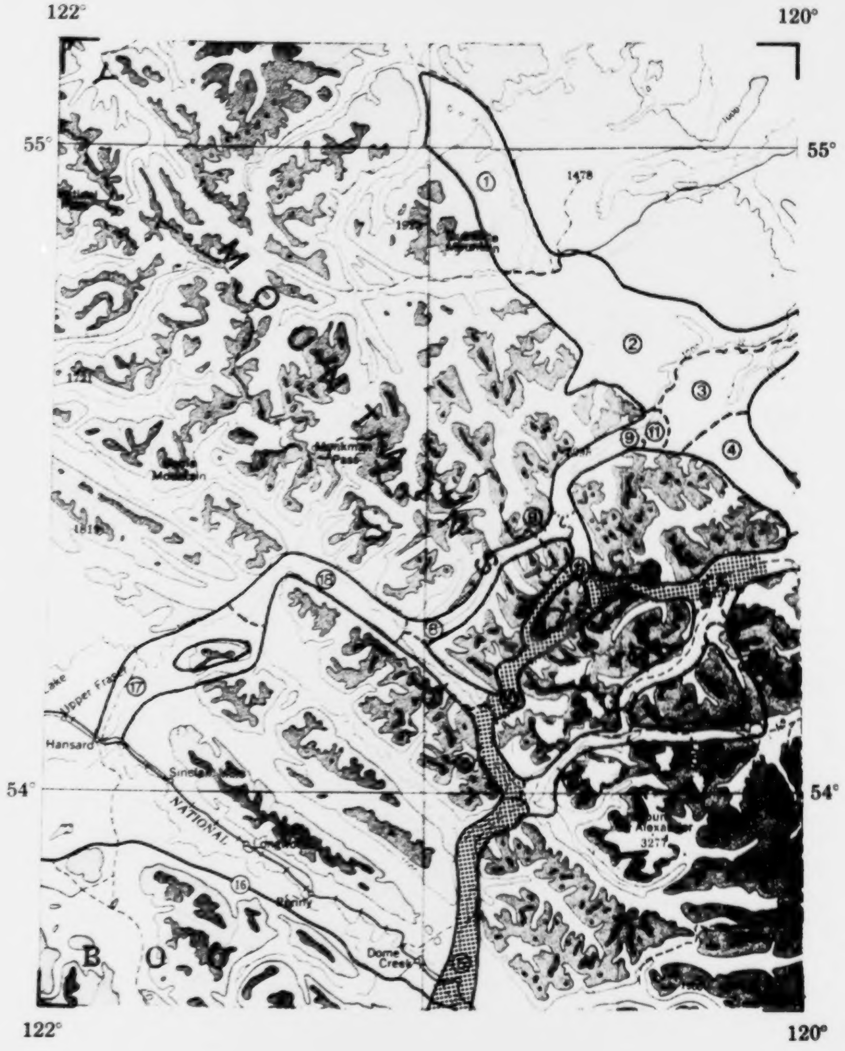
McGregor, McCullagh, Herrick
lleys, Framstead Pass, and the
guenot Valleys.


122°
120°
55°
55°
1478
①
②
③
Redwillow
Monkman
Mountain
Upper Fraser
⑰
Hansard
Sinclair Mills
NATIONAL
Longworth
16
Penny
54°
54°
3277
Dome Creek
B C
122°
120°

B2. DOME CREEK TO SAXON RIDGE

via the Goodson, McGregor and McCullagh Valleys, Herrick or Paksumo Passes, and the Red Deer and Huguenot Valleys.

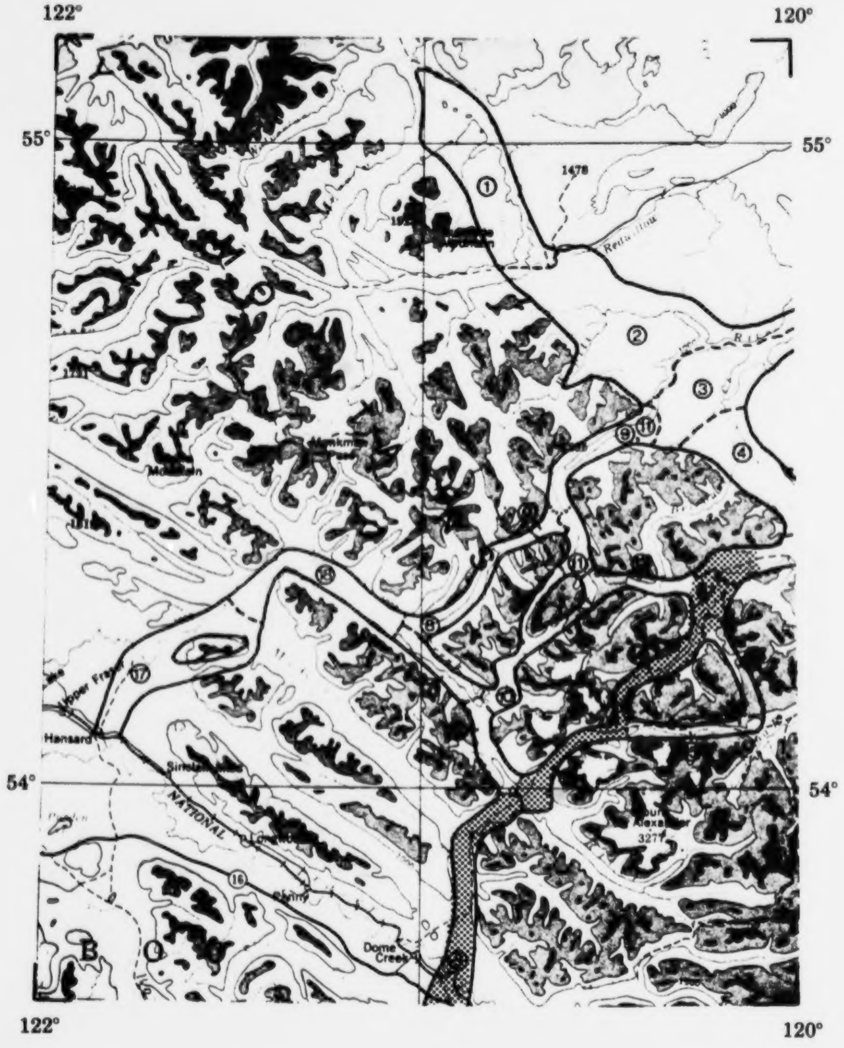
FIGURE 7.1 Cont'd



122°
120°
55°
54°
1478
Hansard
Dome Creek
B
O

B3. DOME CREEK TO SAXON RIDGE

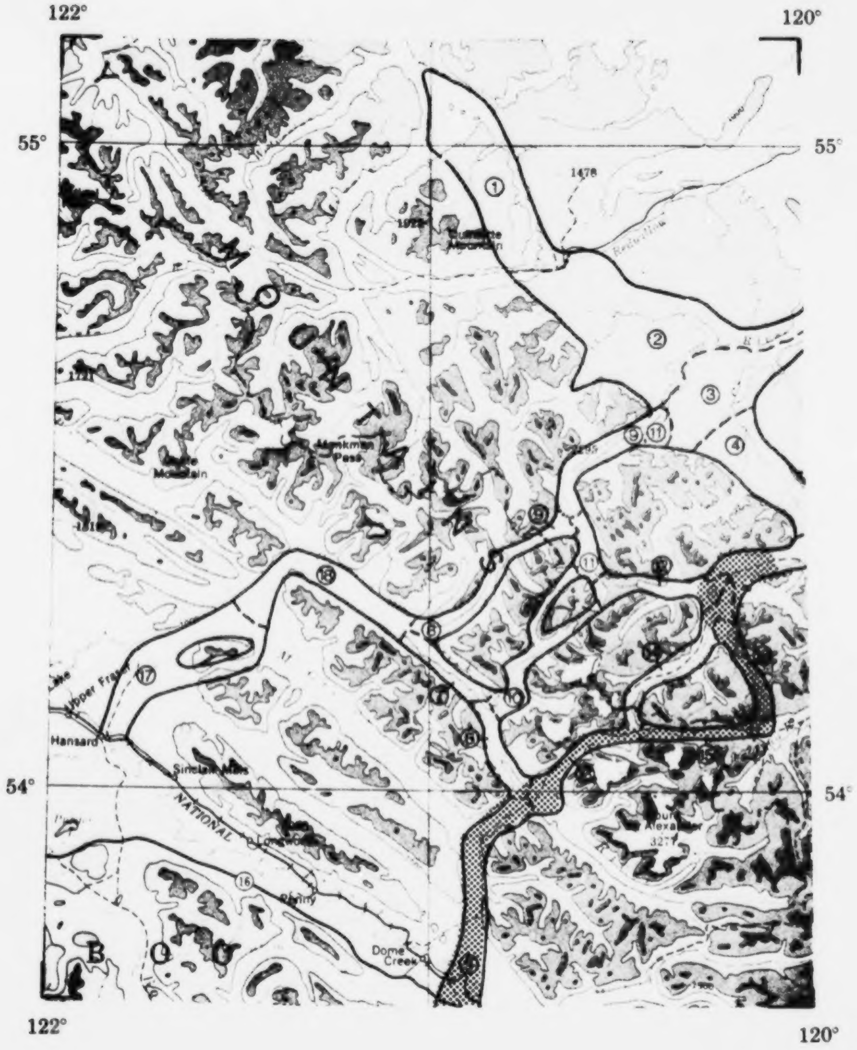
via the Goodson, McGregor and McCullagh Valleys, Herrick or Paksumo Passes, and the Belcourt and Narraway Valleys.



122°
120°
55°
54°
1478
Hansard
Dome Creek
B
O

B4. DOME CREEK TO SAXON RIDGE

via the Goodson, McGregor and Jarvis Valleys, Gray Pass, and the Narraway Valley.

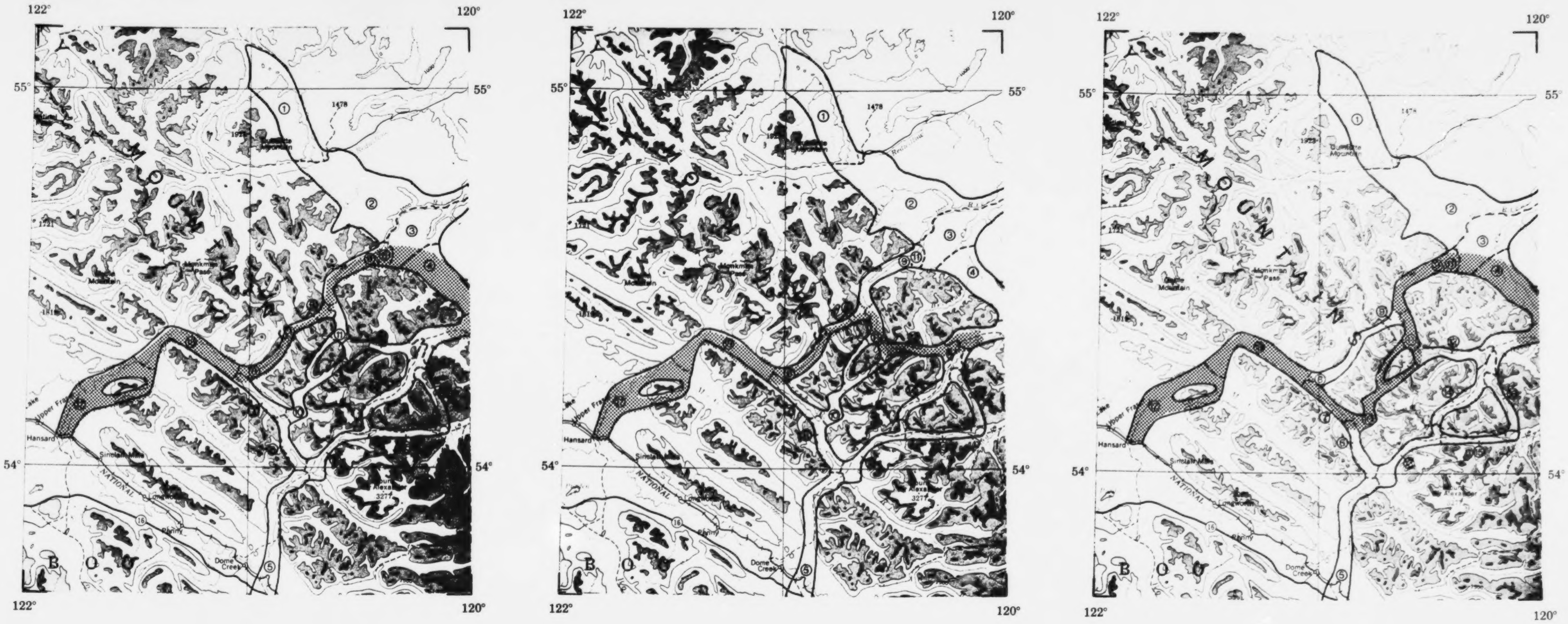


122°
120°
55°
54°
1478
Hansard
Dome Creek
B
O

B5. DOME CREEK TO SAXON RIDGE

via the Goodson, McGregor and Jarvis Valleys, Hanington Pass, and the Hanington and Narraway Valleys.

FIGURE 7.1 Cont'd

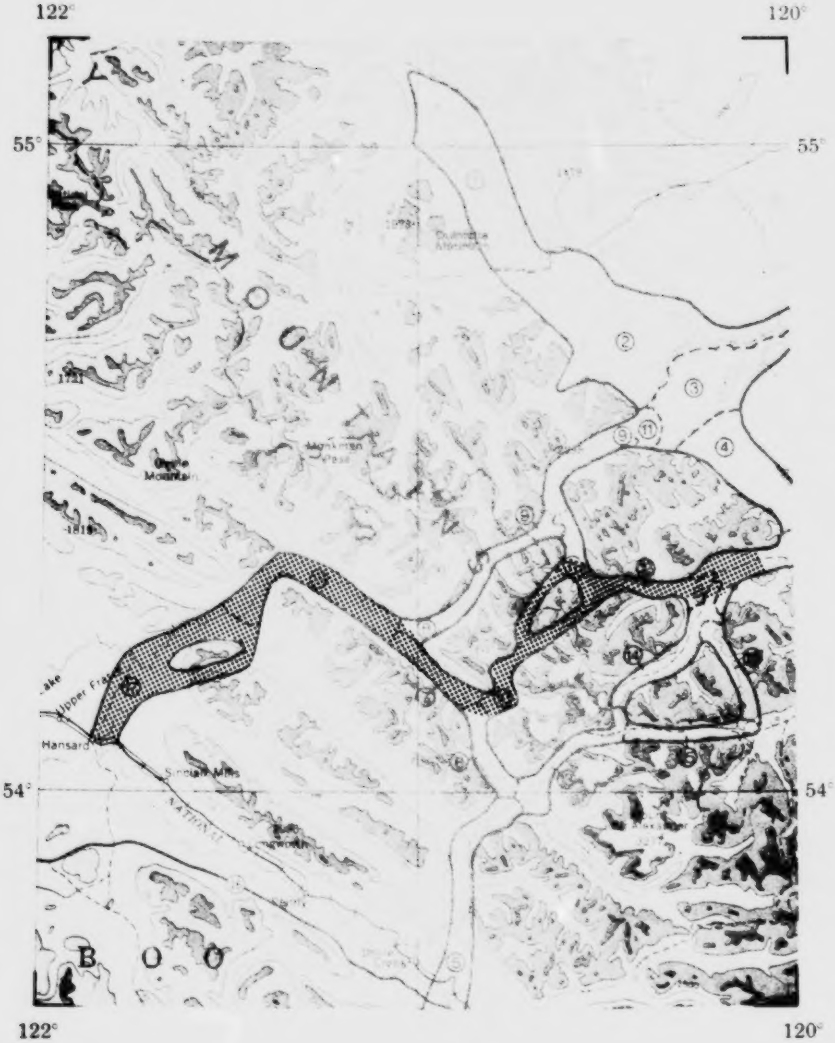

122°
120°
55°
54°
Hansard
Upper Fraser
Dome Creek
Sinclair Mills
NATIONAL
B O
Monkman Pass
Mount Alexander
3277
1478
①
②
③
④
⑤

C1. McGREGOR TO SAXON RIDGE
via the McGregor, Herrick, Framstead, Red Deer and Huguenot Valleys.

C2. McGREGOR TO SAXON RIDGE
via the McGregor, Herrick, Framstead, Red Deer, Belcourt and Narraway Valleys.

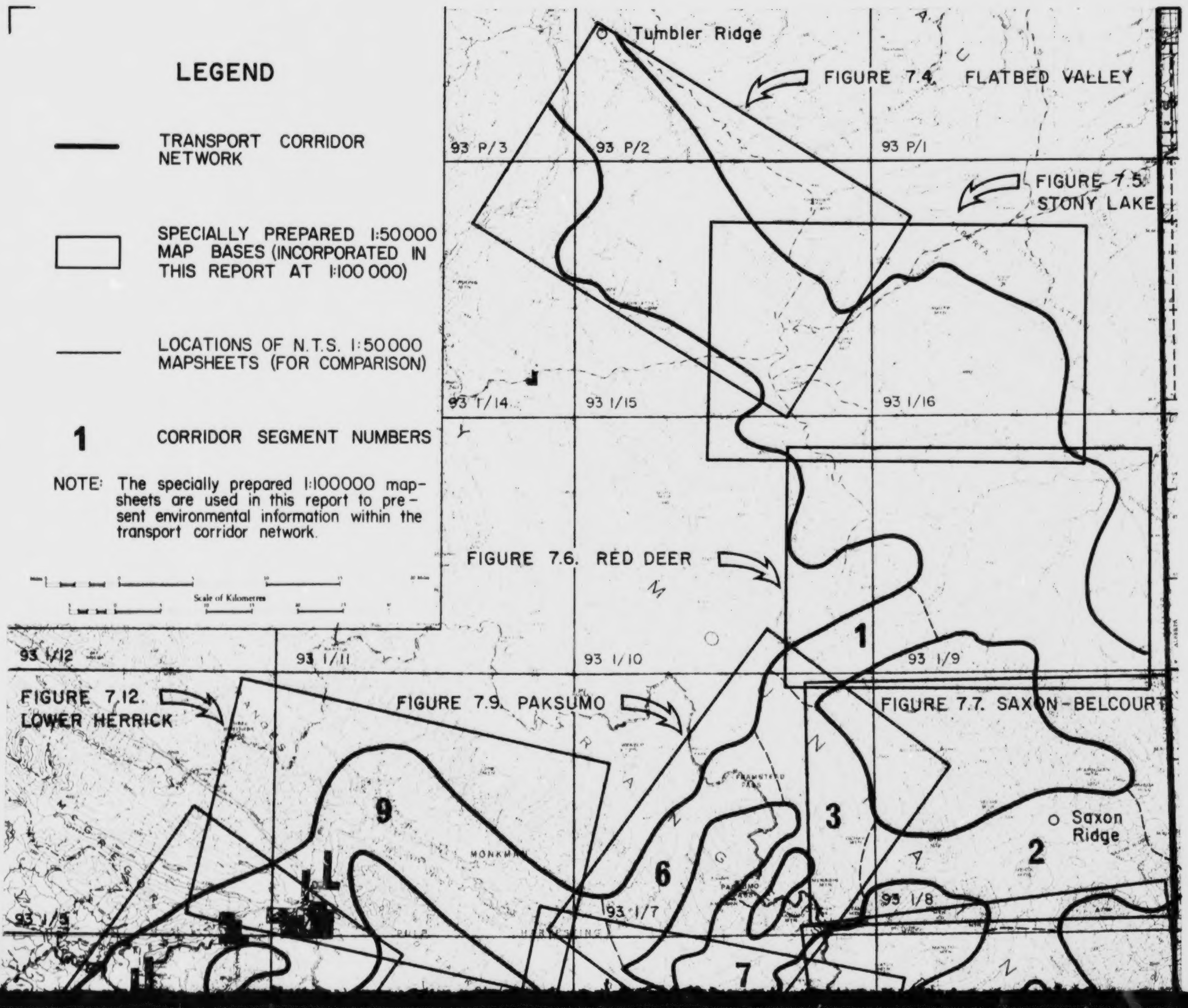
C3. McGREGOR TO SAXON RIDGE
via the McGregor and Herrick Valleys, Herrick or Paksumo Passes, and the Red Deer and Huguenot Valleys.

FIGURE 7.1 Cont'd


122°
120°
55°
55°
1721
1818
Monkman Pass
Hansard
Upper Fraser
Sinclair Mills
②
③
④
⑨
⑪
54°
54°
122°
120°

C4. McGREGOR TO SAXON RIDGE

via the McGregor and Herrick Valleys, Herrick or Paksumo Passes, and the Belcourt and Narraway Valleys.


LEGEND
TRANSPORT CORRIDOR NETWORK
SPECIALLY PREPARED 1:50000 MAP BASES (INCORPORATED IN THIS REPORT AT 1:100 000)
LOCATIONS OF N.T.S. 1:50000 MAPSHEETS (FOR COMPARISON)
1 CORRIDOR SEGMENT NUMBERS
NOTE: The specially prepared 1:100000 mapsheets are used in this report to present environmental information within the transport corridor network.
Scale of Kilometres
Tumbler Ridge
FIGURE 7.4. FLATBED VALLEY
FIGURE 7.5. STONY LAKE
FIGURE 7.6. RED DEER
FIGURE 7.7. SAXON-BELCOURT
FIGURE 7.9. PAKSUMO
FIGURE 7.12. LOWER HERRICK
Saxon Ridge
93 P/3
93 P/2
93 P/1
93 I/14
93 I/15
93 I/16
93 I/12
93 I/11
93 I/10
93 I/9
93 I/5
93 I/7
93 I/8
1
2
3
6
7
9
MONKMAN

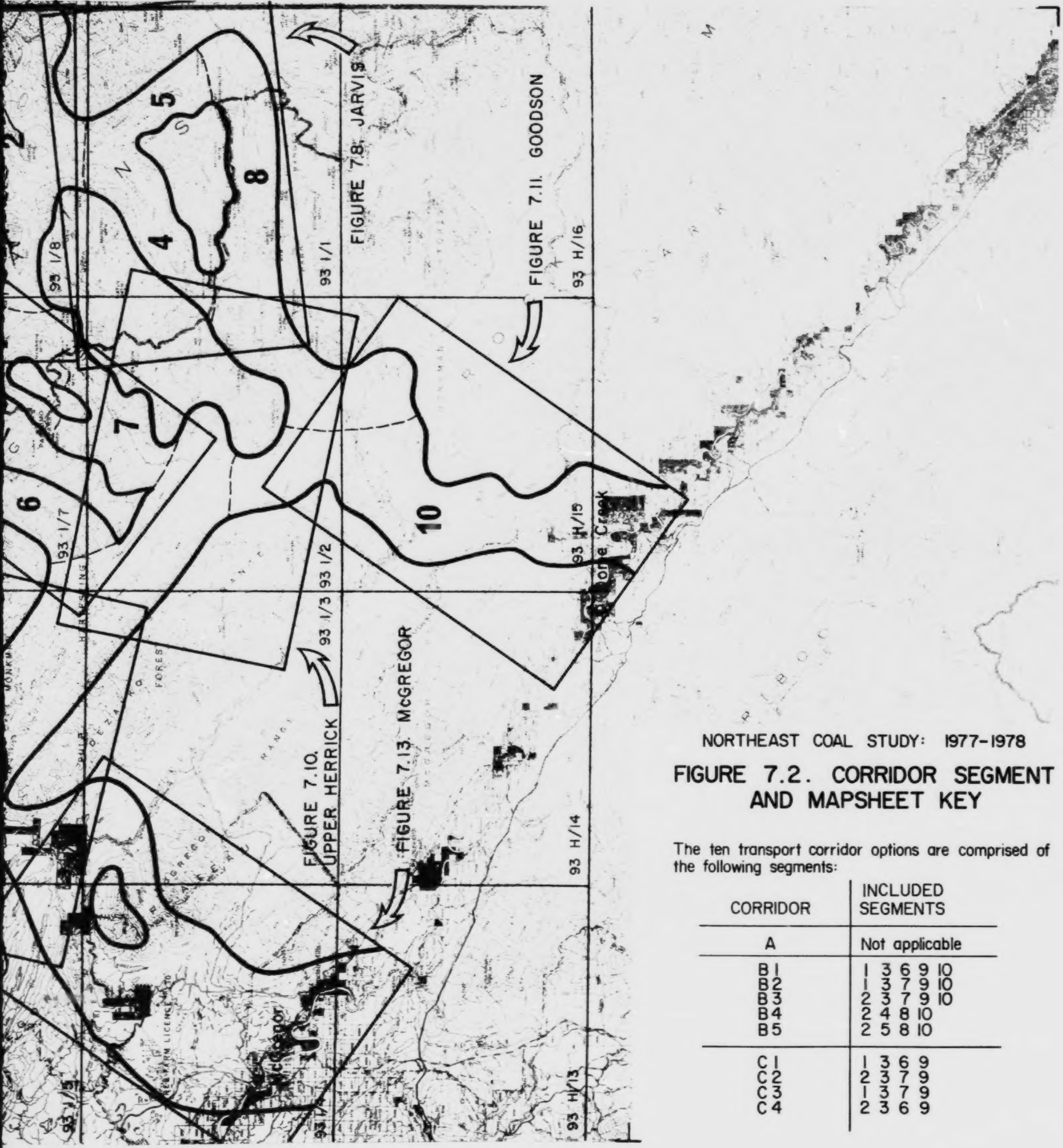


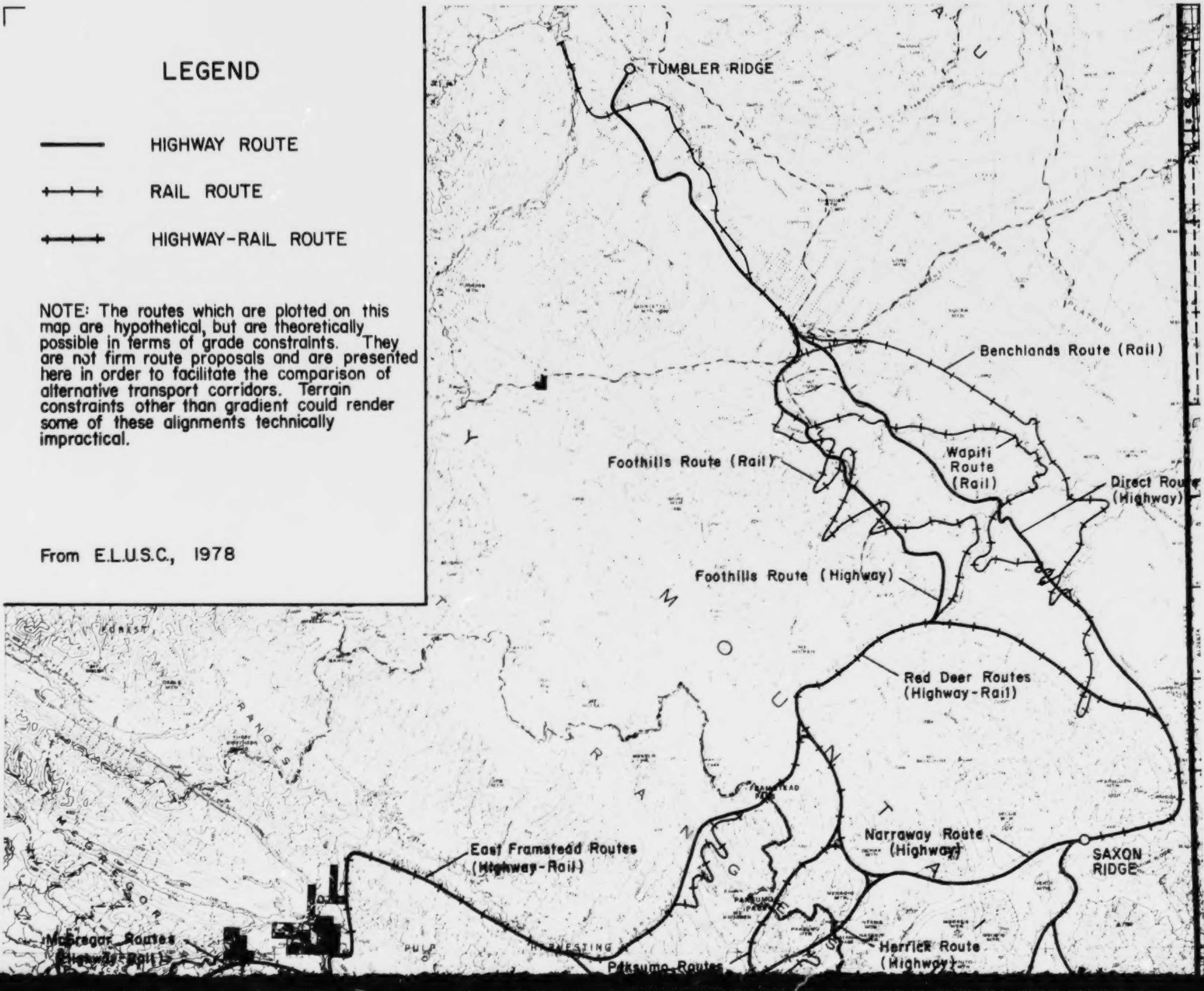
FIGURE 7.8. JARVIS
FIGURE 7.11. GOODSON
FIGURE 7.10. UPPER HERRICK
FIGURE 7.13. McGREGOR
93 I/1
93 I/2
93 I/3
93 I/4
93 I/5
93 I/7
93 I/8
93 H/13
93 H/14
93 H/15
93 H/16
1
2
4
5
6
7
8
10
Bone Creek
McGregor

NORTHEAST COAL STUDY: 1977-1978

FIGURE 7.2. CORRIDOR SEGMENT AND MAPSHEET KEY

The ten transport corridor options are comprised of the following segments:

CORRIDOR	INCLUDED SEGMENTS
A	Not applicable
B1	1 3 6 9 10
B2	1 3 7 9 10
B3	2 3 7 9 10
B4	2 4 8 10
B5	2 5 8 10
C1	1 3 6 9
C2	2 3 7 9
C3	1 3 7 9
C4	2 3 6 9



LEGEND

— HIGHWAY ROUTE

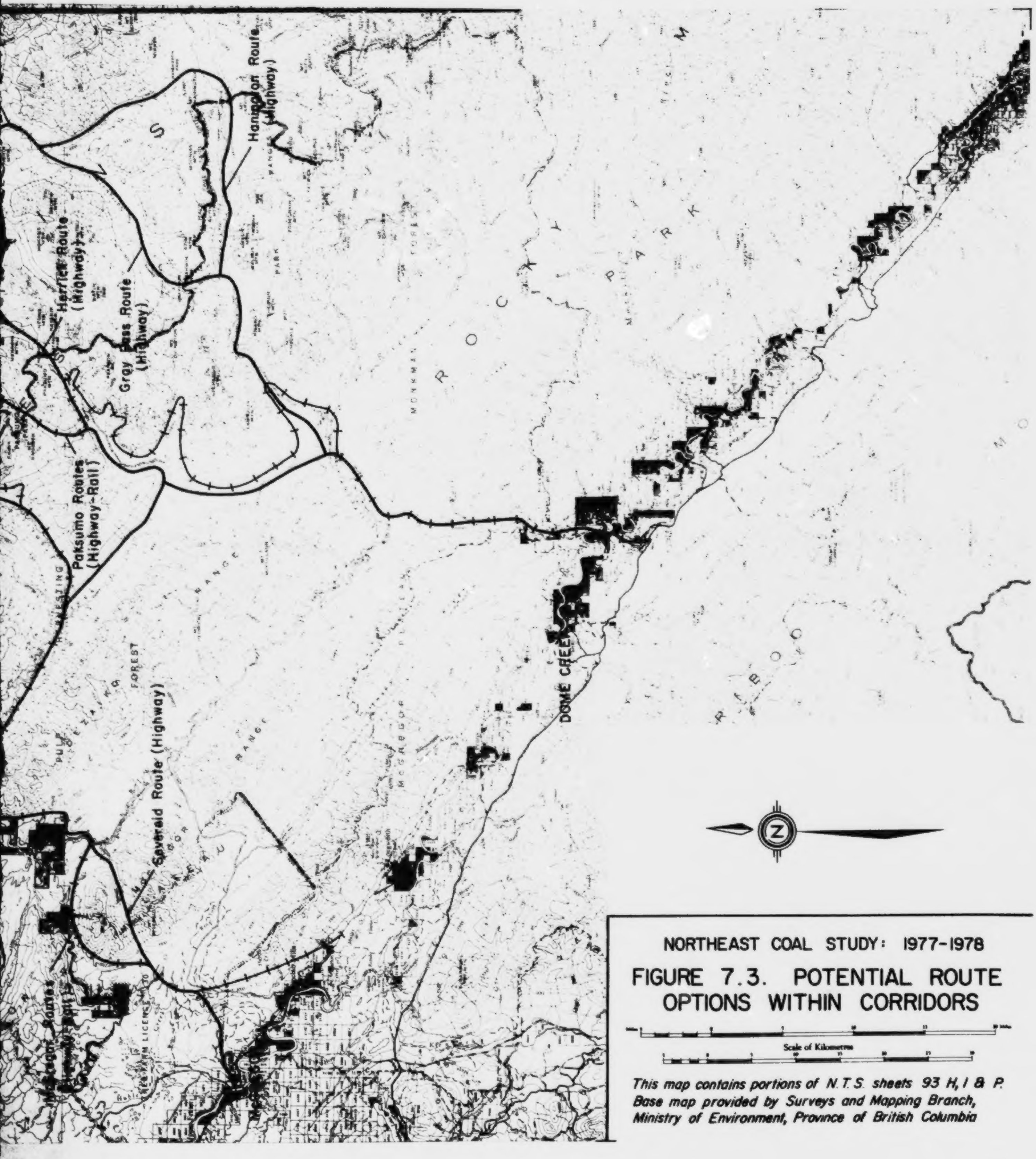
┼┼┼ RAIL ROUTE

┿┿┿ HIGHWAY-RAIL ROUTE

NOTE: The routes which are plotted on this map are hypothetical, but are theoretically possible in terms of grade constraints. They are not firm route proposals and are presented here in order to facilitate the comparison of alternative transport corridors. Terrain constraints other than gradient could render some of these alignments technically impractical.

From E.L.U.S.C., 1978

TUMBLER RIDGE
Benchlands Route (Rail)
Wapiti Route (Rail)
Direct Route (Highway)
Foothills Route (Rail)
Foothills Route (Highway)
Red Deer Routes (Highway-Rail)
Narraway Route (Highway)
SAXON RIDGE
Herrick Route (Highway)
Pinsumo Routes
East Framstead Routes (Highway-Rail)
McGregor Routes (Highway-Rail)
PLATEAU
ALBERTA
MOUNTAIN RANGES
McGREGOR
RANGES
PULP
HARVESTING
FOREST

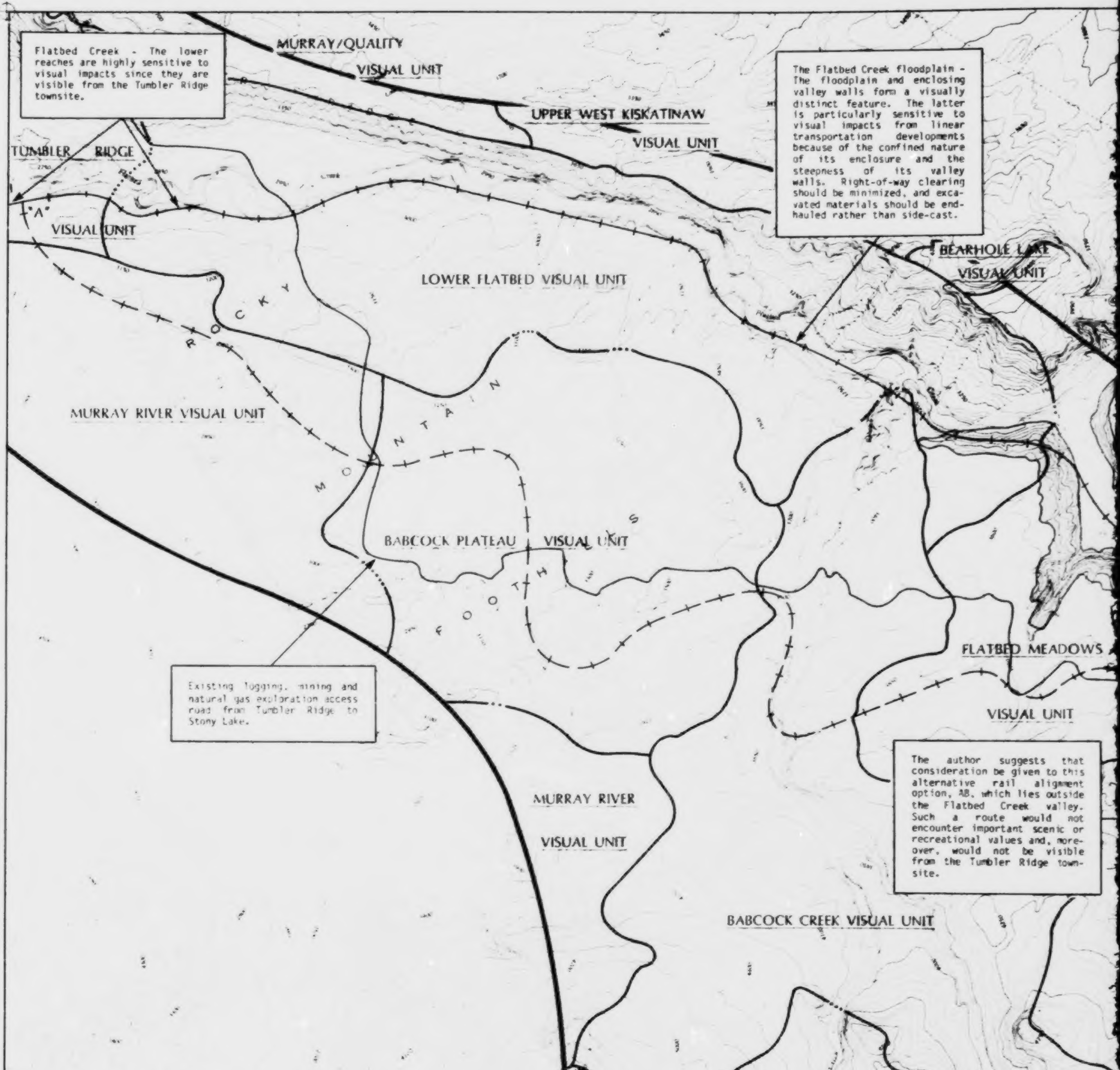

Harrison Route (Highway)
Harrier Route (Highway)
Gray Pass Route (Highway)
Paksumo Routes (Highway-Rail)
Severeid Route (Highway)
McGregor Routes (Highway-Rail)
DOME CREEK
ROCKY MOUNTAIN
PARK RANGES
McGREGOR RANGE
CARIBOO
Z

NORTHEAST COAL STUDY: 1977-1978

FIGURE 7.3. POTENTIAL ROUTE OPTIONS WITHIN CORRIDORS

Scale of Kilometres

This map contains portions of N.T.S. sheets 93 H, I & P.
Base map provided by Surveys and Mapping Branch, Ministry of Environment, Province of British Columbia

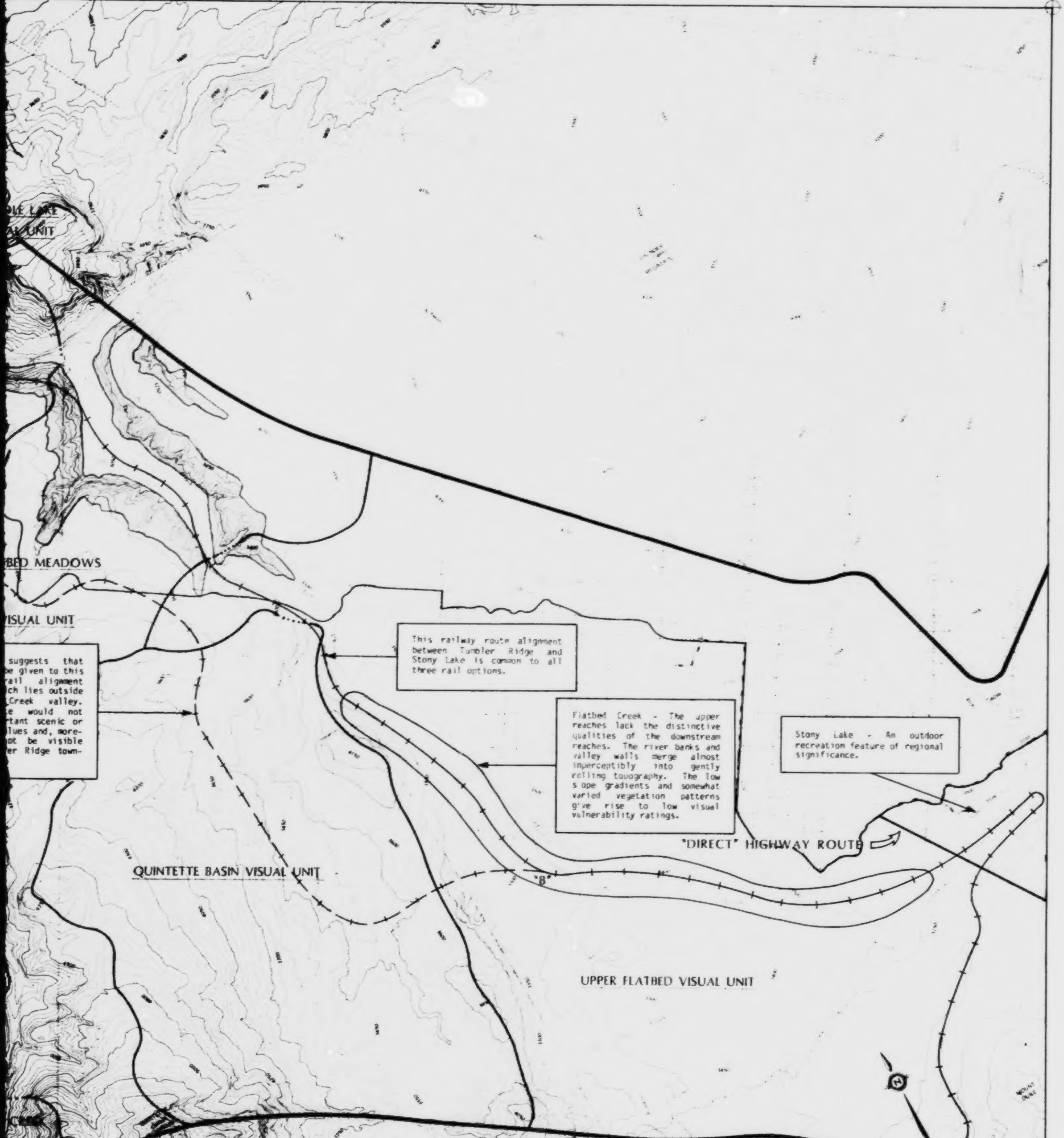

MURRAY/QUALITY VISUAL UNIT
UPPER WEST KISKATINAW VISUAL UNIT
TUMBLER RIDGE "A" VISUAL UNIT
BEARHOLE LAKE VISUAL UNIT
LOWER FLATBED VISUAL UNIT
ROCKY MOUNTAIN FOOTHILLS
MURRAY RIVER VISUAL UNIT
BABCOCK PLATEAU VISUAL UNIT
FLATBED MEADOWS VISUAL UNIT
MURRAY RIVER VISUAL UNIT
BABCOCK CREEK VISUAL UNIT
UPPER BABCOCK VISUAL UNIT
FIVE CABIN CREEK VISUAL UNIT

Flatbed Creek - The lower reaches are highly sensitive to visual impacts since they are visible from the Tumbler Ridge townsite.

The Flatbed Creek floodplain - The floodplain and enclosing valley walls form a visually distinct feature. The latter is particularly sensitive to visual impacts from linear transportation developments because of the confined nature of its enclosure and the steepness of its valley walls. Right-of-way clearing should be minimized, and excavated materials should be end-hauled rather than side-cast.

Existing logging, mining and natural gas exploration access road from Tumbler Ridge to Stony Lake.

The author suggests that consideration be given to this alternative rail alignment option, AB, which lies outside the Flatbed Creek valley. Such a route would not encounter important scenic or recreational values and, moreover, would not be visible from the Tumbler Ridge townsite.


OLE LAKE
AL UNIT
BED MEADOWS
VISUAL UNIT
QUINTETTE BASIN VISUAL UNIT
'B'
"DIRECT" HIGHWAY ROUTE
UPPER FLATBED VISUAL UNIT
N

suggests that
be given to this
rail alignment
ich lies outside
Creek valley.
e would not
rtant scenic or
lues and, more-
ot be visible
er Ridge town-

This railway route alignment between Tumbler Ridge and Stony Lake is common to all three rail options.

Flatbed Creek - The upper reaches lack the distinctive qualities of the downstream reaches. The river banks and valley walls merge almost imperceptibly into gently rolling topography. The low slope gradients and somewhat varied vegetation patterns give rise to low visual vulnerability ratings.

Stony Lake - An outdoor recreation feature of regional significance.

FIGURE 7.4. FLATBED VALLEY

LEGEND

TRANSPORT ROUTE OPTIONS

━━━━	TRANSPORT CORRIDOR BOUNDARY
────	PROPOSED HIGHWAY ROUTE
─┼─┼─┼─	PROPOSED RAILWAY ROUTE
– – – –	ALTERNATIVE HIGHWAY ROUTE (based on visual analysis)
-+-+-+-+-	ALTERNATIVE RAILWAY ROUTE (based on visual analysis)
──┼──┼──	PROPOSED JOINT HIGHWAY/RAILWAY ROUTE

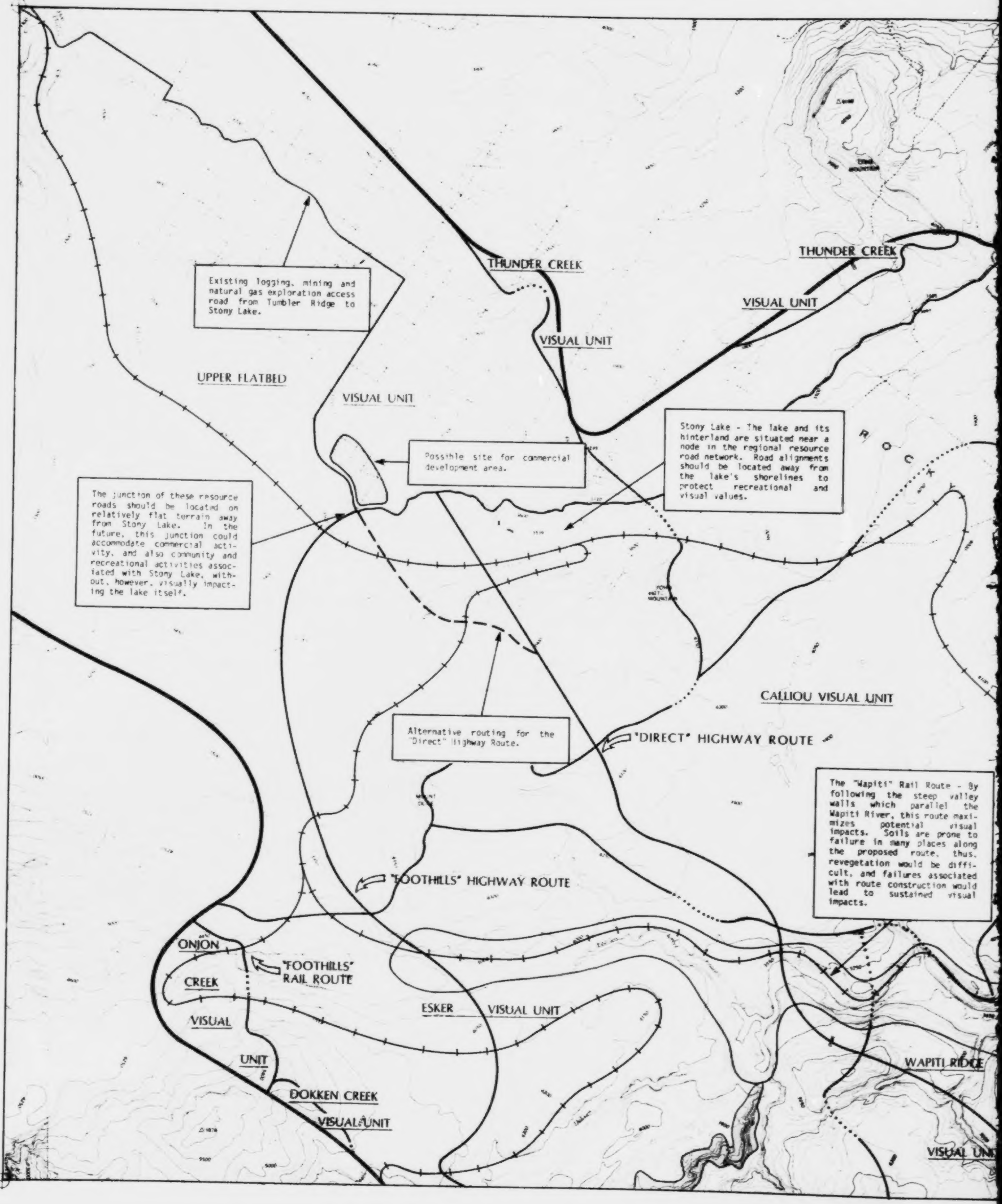
VISUAL ANALYSIS

────	VISUAL UNIT BOUNDARY
—·······—	PORTAL IN VISUAL UNIT BOUNDARY
JARVIS VISUAL UNIT	NAME OF VISUAL UNIT
⬭	LOCATION OF VISUAL SIGNIFICANCE

TERRAIN ANALYSIS

▨	HAZARDOUS TERRAIN - broad or linear avalanche zone
	SENSITIVE TERRAIN - silts and lacustrine soils presently subject to failure, gullying, piping and/or erosion
- - - -	INTERPOLATED TERRAIN UNIT BOUNDARY

Base map created from N. T. S. 1:50 000 maps provided by Surveys and Mapping Branch, Ministry of Environment, Victoria, B. C.



THUNDER CREEK
VISUAL UNIT
THUNDER CREEK
VISUAL UNIT
UPPER FLATBED
VISUAL UNIT
R O C K Y
CALLIOU VISUAL UNIT
"DIRECT" HIGHWAY ROUTE
"FOOTHILLS" HIGHWAY ROUTE
ONJON
CREEK
VISUAL
UNIT
"FOOTHILLS"
RAIL ROUTE
ESKER VISUAL UNIT
DOKKEN CREEK
VISUAL UNIT
WAPITI RIDGE
VISUAL UNI

Existing logging, mining and natural gas exploration access road from Tumbler Ridge to Stony Lake.

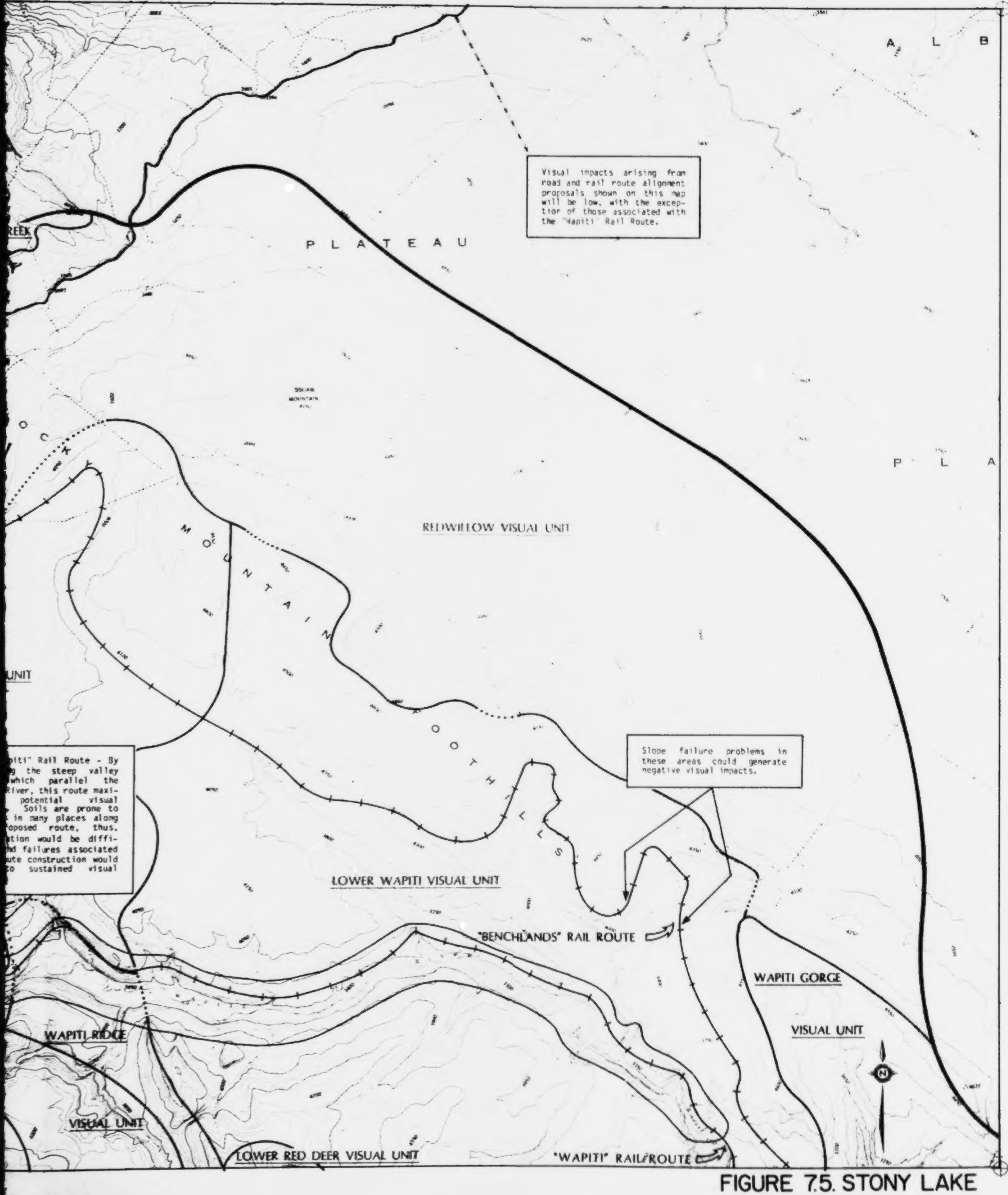
Possible site for commercial development area.

Stony Lake - The lake and its hinterland are situated near a node in the regional resource road network. Road alignments should be located away from the lake's shorelines to protect recreational and visual values.

The junction of these resource roads should be located on relatively flat terrain away from Stony Lake. In the future, this junction could accommodate commercial activity, and also community and recreational activities associated with Stony Lake, without, however, visually impacting the lake itself.

Alternative routing for the "Direct" Highway Route.

The "Wapiti" Rail Route - By following the steep valley walls which parallel the Wapiti River, this route maximizes potential visual impacts. Soils are prone to failure in many places along the proposed route, thus, revegetation would be difficult, and failures associated with route construction would lead to sustained visual impacts.


A L B
P L A T E A U
P L A
REEK
O C K Y
M O U N T A I N
F O O T H I L L S
SQUAW MOUNTAIN
REDWILLOW VISUAL UNIT
UNIT
LOWER WAPITI VISUAL UNIT
"BENCHLANDS" RAIL ROUTE
WAPITI GORGE
VISUAL UNIT
WAPITI RIDGE
VISUAL UNIT
LOWER RED DEER VISUAL UNIT
"WAPITI" RAIL ROUTE
N

Visual impacts arising from road and rail route alignment proposals shown on this map will be low, with the exception of those associated with the "Wapiti" Rail Route.

Slope failure problems in these areas could generate negative visual impacts.

piti" Rail Route - By
g the steep valley
which parallel the
River, this route maxi-
potential visual
Soils are prone to
in many places along
roposed route, thus.
ation would be diffi-
nd failures associated
ute construction would
to sustained visual

FIGURE 7.5. STONY LAKE

LEGEND

TRANSPORT ROUTE OPTIONS

━━━	TRANSPORT CORRIDOR BOUNDARY
———	PROPOSED HIGHWAY ROUTE
—+—+—	PROPOSED RAILWAY ROUTE
– – – –	ALTERNATIVE HIGHWAY ROUTE (based on visual analysis)
-+-+-+-+-	ALTERNATIVE RAILWAY ROUTE (based on visual analysis)
—+——+—	PROPOSED JOINT HIGHWAY/RAILWAY ROUTE

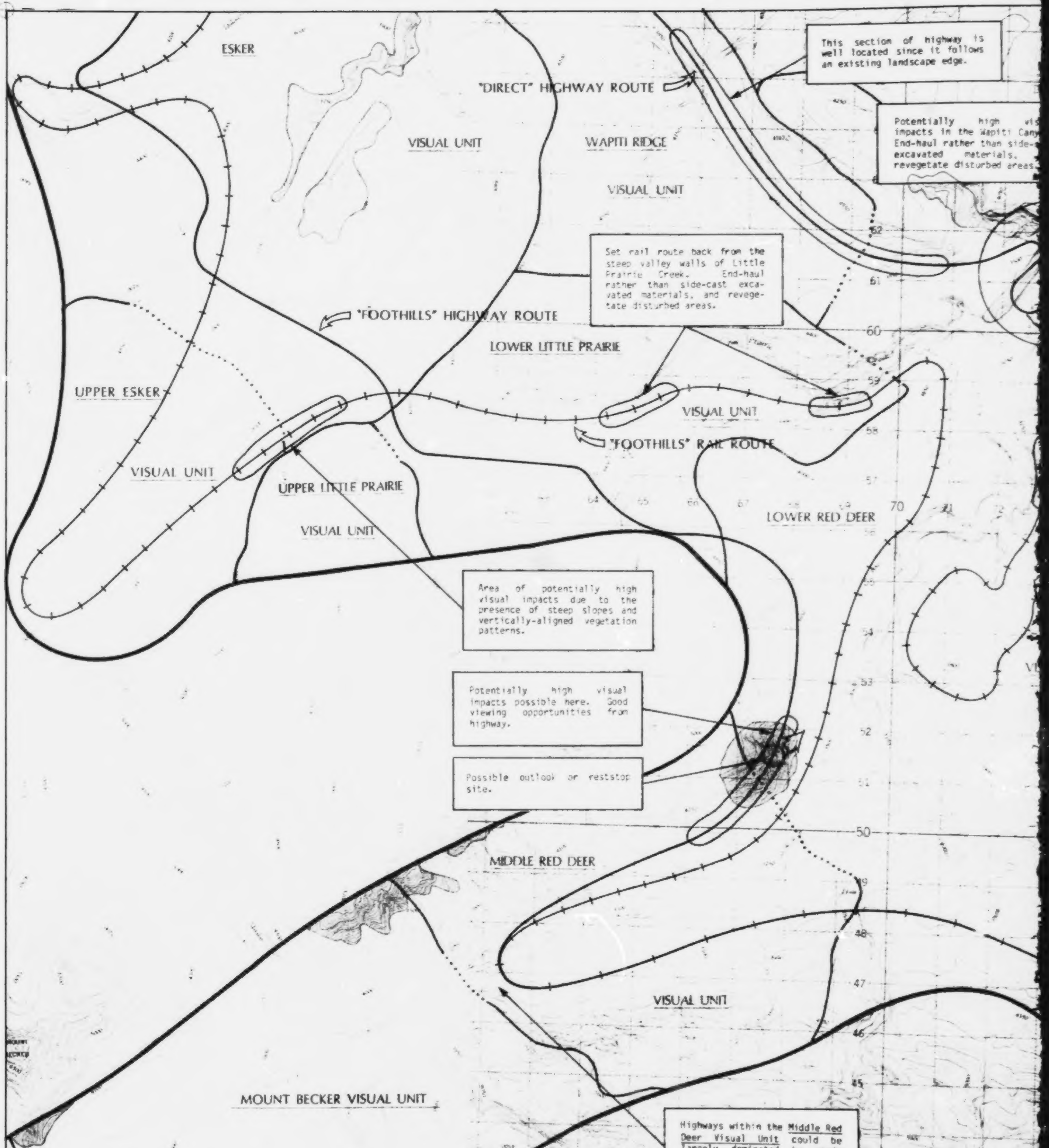
VISUAL ANALYSIS

———	VISUAL UNIT BOUNDARY
—……—	PORTAL IN VISUAL UNIT BOUNDARY
JARVIS VISUAL UNIT	NAME OF VISUAL UNIT
⬭	LOCATION OF VISUAL SIGNIFICANCE

TERRAIN ANALYSIS

	HAZARDOUS TERRAIN - broad or linear avalanche zone
	SENSITIVE TERRAIN - silts and lacustrine soils presently subject to failure, gullying, piping and/or erosion
	INTERPOLATED TERRAIN UNIT BOUNDARY

Base map created from N.T.S. 1:50 000 maps provided by Surveys and Mapping Branch, Ministry of Environment, Victoria, B.C.


ESKER
"DIRECT" HIGHWAY ROUTE
VISUAL UNIT
WAPITI RIDGE
VISUAL UNIT
"FOOTHILLS" HIGHWAY ROUTE
LOWER LITTLE PRAIRIE
UPPER ESKER
VISUAL UNIT
"FOOTHILLS" RAIL ROUTE
VISUAL UNIT
UPPER LITTLE PRAIRIE
VISUAL UNIT
LOWER RED DEER
MIDDLE RED DEER
VISUAL UNIT
MOUNT BECKER VISUAL UNIT
MOUNT BECKER
62
61
60
59
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57
56
55
54
53
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45
64
65
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67
70
71

This section of highway is well located since it follows an existing landscape edge.

Potentially high vis
impacts in the Wapiti Cany
End-haul rather than side-
excavated materials.
revegetate disturbed areas.

Set rail route back from the steep valley walls of Little Prairie Creek. End-haul rather than side-cast excavated materials, and revegetate disturbed areas.

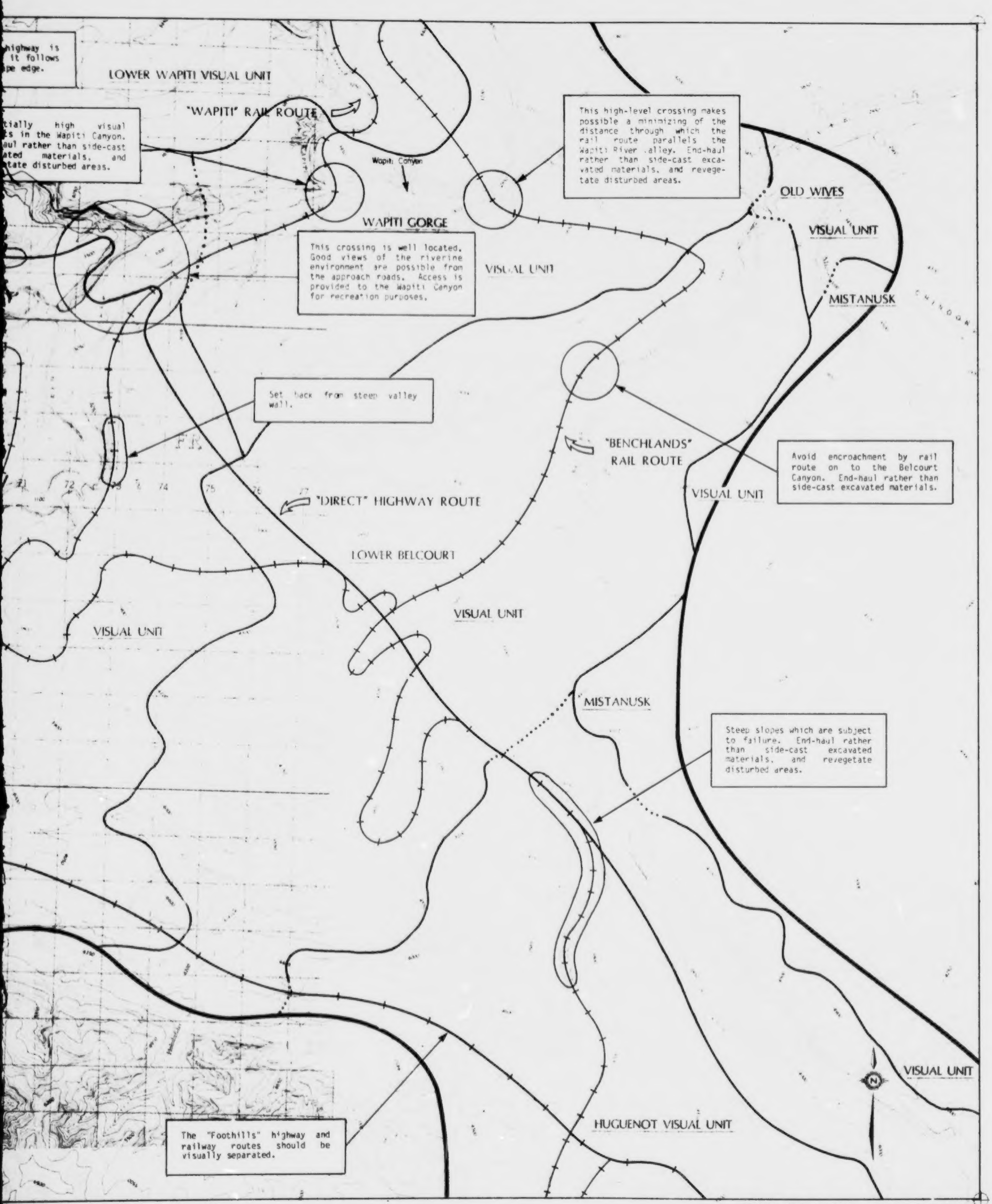
Area of potentially high visual impacts due to the presence of steep slopes and vertically-aligned vegetation patterns.

Potentially high visual impacts possible here. Good viewing opportunities from highway.

Possible outlook or reststop site.

Highways within the Middle Red Deer Visual Unit could be largely dominated by strip mining and minesite development.

Vegetation and landform buffer strips should be left between roads and gravel pits. Stockpile top soil for reclamation.


LOWER WAPITI VISUAL UNIT
"WAPITI" RAIL ROUTE
Wapiti Canyon
WAPITI GORGE
VISUAL UNIT
OLD WIVES
VISUAL UNIT
MISTANUSK
CHINOOK
"BENCHLANDS"
RAIL ROUTE
FR
71
72
73
74
75
76
77
"DIRECT" HIGHWAY ROUTE
VISUAL UNIT
LOWER BELCOURT
VISUAL UNIT
VISUAL UNIT
MISTANUSK
VISUAL UNIT
N
HUGUENOT VISUAL UNIT

highway is
it follows
pe edge.

tially high visual
ts in the Wapiti Canyon.
aul rather than side-cast
ated materials, and
tate disturbed areas.

This high-level crossing makes possible a minimizing of the distance through which the rail route parallels the Wapiti River valley. End-haul rather than side-cast excavated materials, and revegetate disturbed areas.

This crossing is well located. Good views of the riverine environment are possible from the approach roads. Access is provided to the Wapiti Canyon for recreation purposes.

Set back from steep valley wall.

Avoid encroachment by rail route on to the Belcourt Canyon. End-haul rather than side-cast excavated materials.

Steep slopes which are subject to failure. End-haul rather than side-cast excavated materials, and revegetate disturbed areas.

The "Foothills" highway and railway routes should be visually separated.

FIGURE 7.6. RED DEER

LEGEND

TRANSPORT ROUTE OPTIONS

━━━━	TRANSPORT CORRIDOR BOUNDARY
────	PROPOSED HIGHWAY ROUTE
—+—+—+—	PROPOSED RAILWAY ROUTE
— — — —	ALTERNATIVE HIGHWAY ROUTE (based on visual analysis)
++++	ALTERNATIVE RAILWAY ROUTE (based on visual analysis)
——+——+—	PROPOSED JOINT HIGHWAY/RAILWAY ROUTE

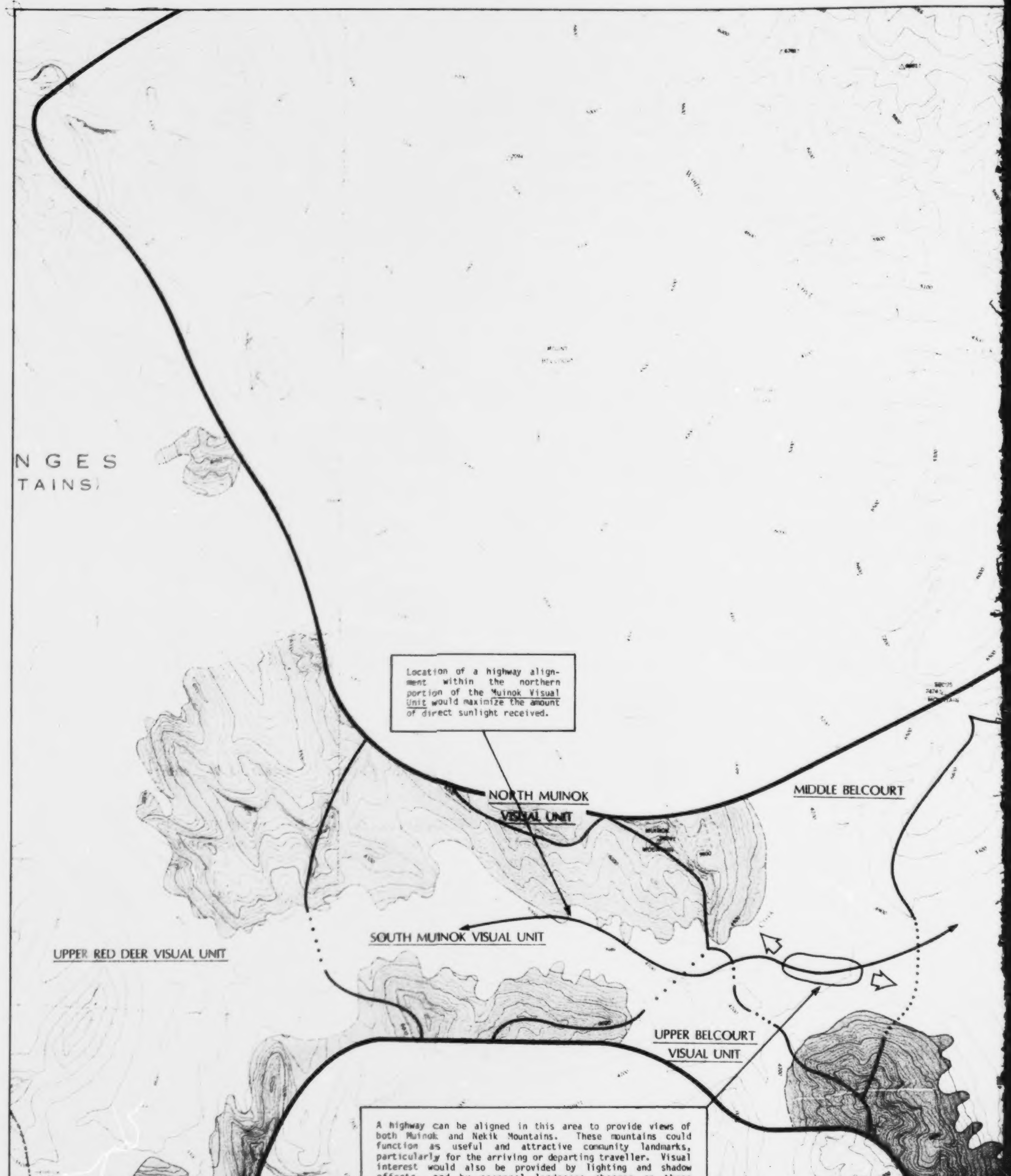
VISUAL ANALYSIS

────	VISUAL UNIT BOUNDARY
—······—	PORTAL IN VISUAL UNIT BOUNDARY
JARVIS VISUAL UNIT	NAME OF VISUAL UNIT
⬭	LOCATION OF VISUAL SIGNIFICANCE

TERRAIN ANALYSIS

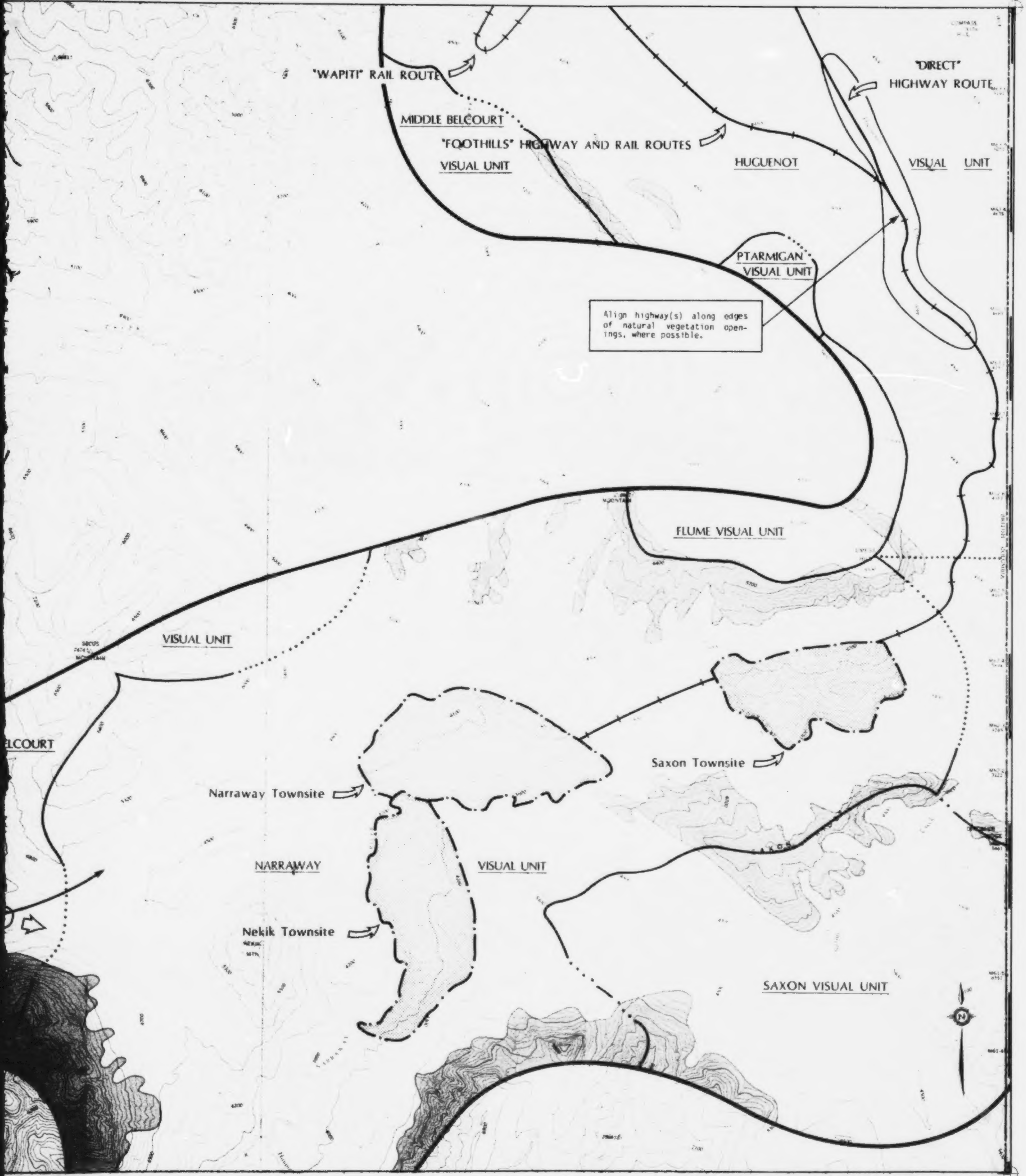
░	HAZARDOUS TERRAIN - broad or linear avalanche zone
	SENSITIVE TERRAIN - silts and lacustrine soils presently subject to failure, gullying, piping and/or erosion
······	INTERPOLATED TERRAIN UNIT BOUNDARY

Base map created from N.T.S. 1:50 000 maps provided by Surveys and Mapping Branch, Ministry of Environment, Victoria, B.C.


N G E S
TAINS)
NORTH MUINOK
VISUAL UNIT
MIDDLE BELCOURT
SOUTH MUINOK VISUAL UNIT
UPPER RED DEER VISUAL UNIT
UPPER BELCOURT
VISUAL UNIT
MOUNTAIN

Location of a highway alignment within the northern portion of the Muinok Visual Unit would maximize the amount of direct sunlight received.

A highway can be aligned in this area to provide views of both Muinok and Nekik Mountains. These mountains could function as useful and attractive community landmarks, particularly for the arriving or departing traveller. Visual interest would also be provided by lighting and shadow effects, and by seasonal landscape changes on these mountains. Patch logging might be a useful means of exposing the forms of the two mountains (by opening up the forest canopy).


"WAPITI" RAIL ROUTE
"DIRECT" HIGHWAY ROUTE
MIDDLE BELCOURT VISUAL UNIT
"FOOTHILLS" HIGHWAY AND RAIL ROUTES
HUGUENOT VISUAL UNIT
PTARMIGAN VISUAL UNIT
FLUME VISUAL UNIT
VISUAL UNIT
ELCOURT
Saxon Townsite
Narraway Townsite
NARRAWAY VISUAL UNIT
Nekik Townsite
SAXON VISUAL UNIT
N

Align highway(s) along edges of natural vegetation openings, where possible.

FIGURE 7.7. SAXON-BELCOURT

LEGEND

TRANSPORT ROUTE OPTIONS

━━━━	TRANSPORT CORRIDOR BOUNDARY
────	PROPOSED HIGHWAY ROUTE
─┼─┼─┼─	PROPOSED RAILWAY ROUTE
– – – –	ALTERNATIVE HIGHWAY ROUTE (based on visual analysis)
+ + + +	ALTERNATIVE RAILWAY ROUTE (based on visual analysis)
─┼───┼─	PROPOSED JOINT HIGHWAY/RAILWAY ROUTE

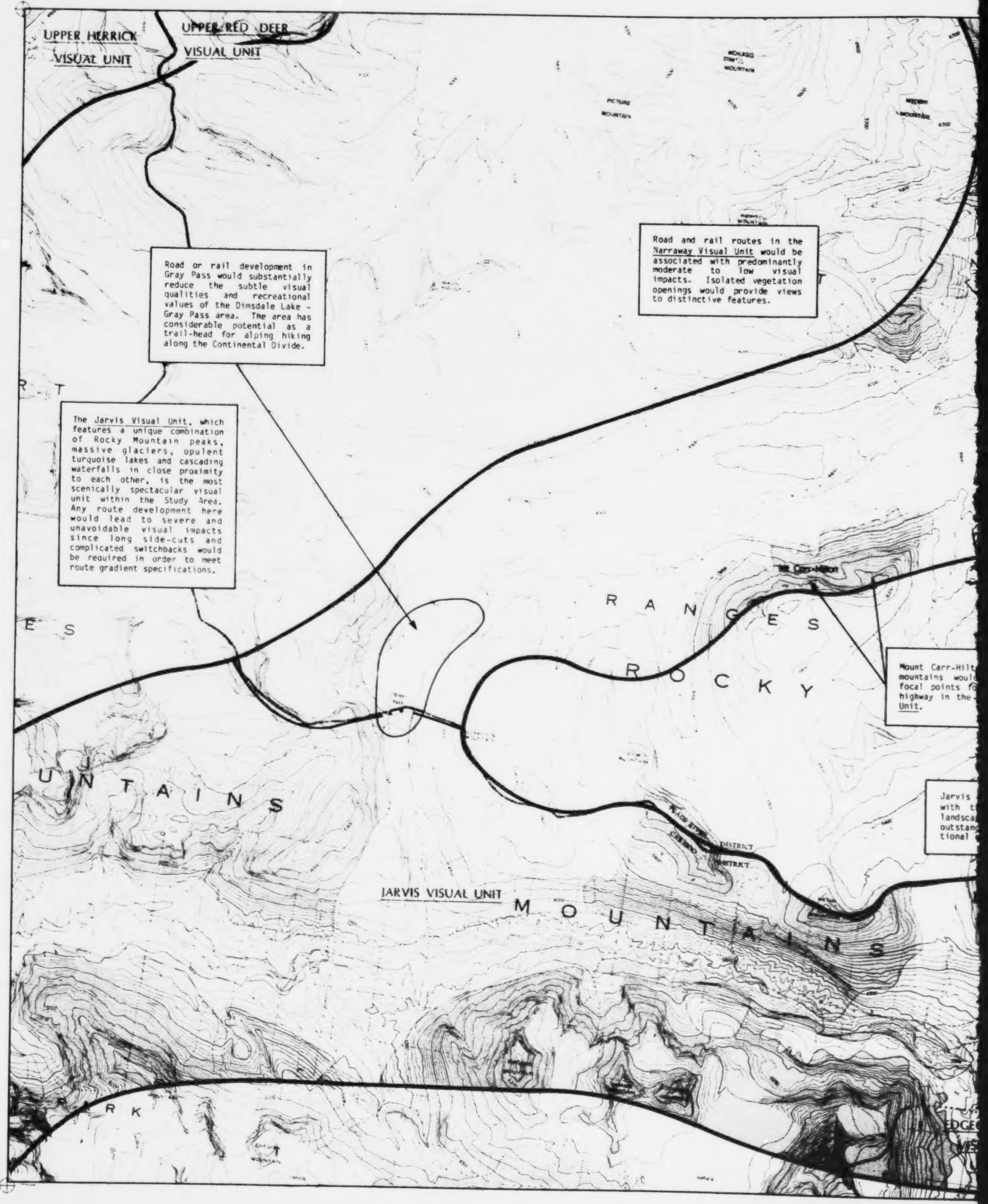
VISUAL ANALYSIS

────	VISUAL UNIT BOUNDARY
─······─	PORTAL IN VISUAL UNIT BOUNDARY
JARVIS VISUAL UNIT	NAME OF VISUAL UNIT
⬭	LOCATION OF VISUAL SIGNIFICANCE

TERRAIN ANALYSIS

░	HAZARDOUS TERRAIN - broad or linear avalanche zone
	SENSITIVE TERRAIN - silts and lacustrine soils presently subject to failure, gullying, piping and/or erosion
- - - -	INTERPOLATED TERRAIN UNIT BOUNDARY

Base map created from N. T. S. 1:50 000 maps provided by Surveys and Mapping Branch, Ministry of Environment, Victoria, B. C.


UPPER HERRICK VISUAL UNIT
UPPER RED DEER VISUAL UNIT
PICTURE MOUNTAIN
MOUNTAIN
MOUNTAIN
R T
E S
RANGES
ROCKY
Mt. Carr-Hilton
UNTAINS
MOUNTAINS
JARVIS VISUAL UNIT
DISTRICT
DISTRICT
R K
EDGE
VIS
U

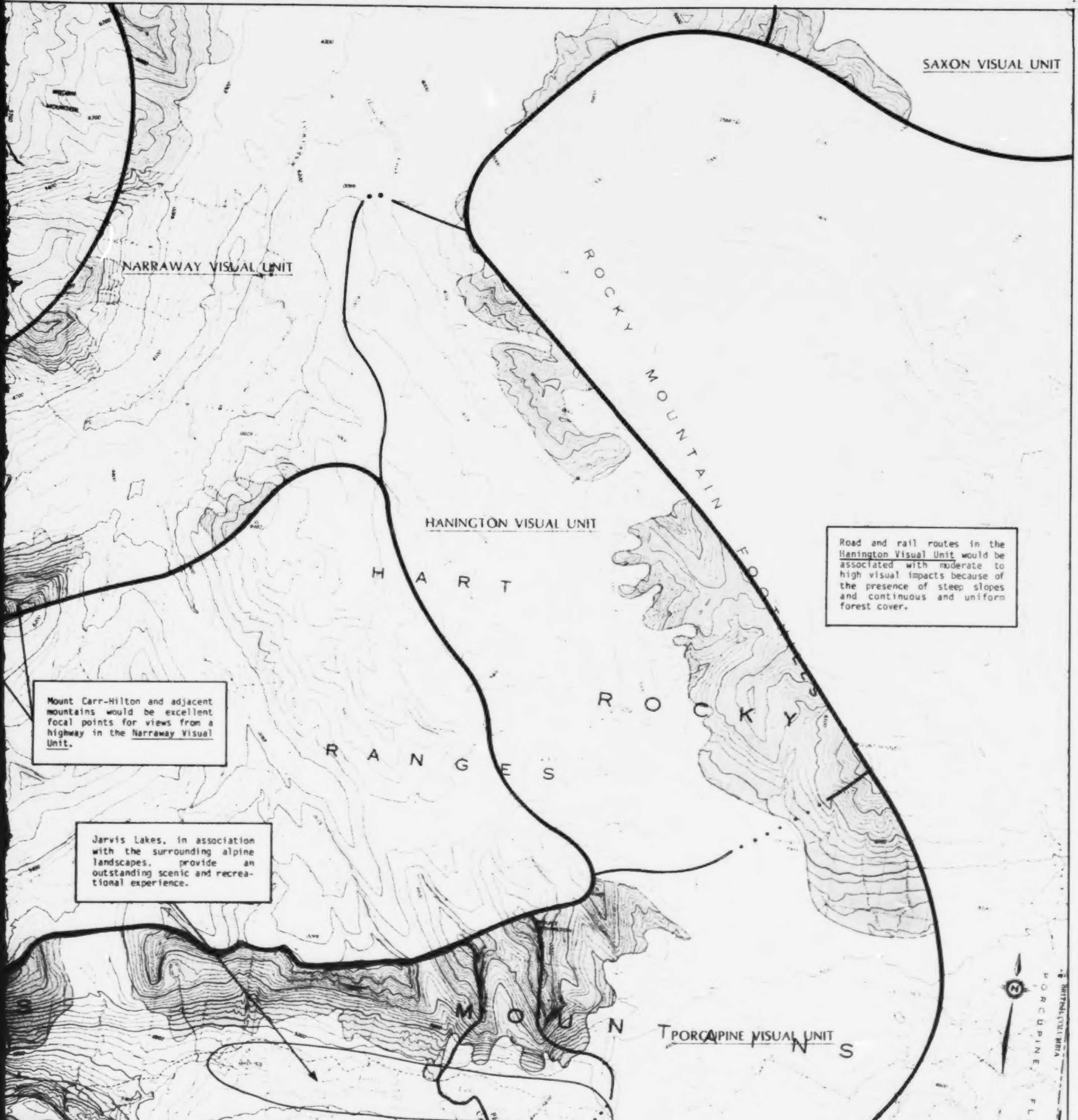
Road or rail development in Gray Pass would substantially reduce the subtle visual qualities and recreational values of the Dimsdale Lake - Gray Pass area. The area has considerable potential as a trail-head for alping hiking along the Continental Divide.

Road and rail routes in the Narraway Visual Unit would be associated with predominantly moderate to low visual impacts. Isolated vegetation openings would provide views to distinctive features.

The Jarvis Visual Unit, which features a unique combination of Rocky Mountain peaks, massive glaciers, opulent turquoise lakes and cascading waterfalls in close proximity to each other, is the most scenically spectacular visual unit within the Study Area. Any route development here would lead to severe and unavoidable visual impacts since long side-cuts and complicated switchbacks would be required in order to meet route gradient specifications.

Mount Carr-Hilt
mountains woul
focal points fo
highway in the
Unit.

Jarvis
with t
landsca
outstan
tional


SAXON VISUAL UNIT
NARRAWAY VISUAL UNIT
HANINGTON VISUAL UNIT
PORCUPINE VISUAL UNIT
EDGEGRAIN VISUAL UNIT
ROCKY MOUNTAIN FOOTHILLS
HART RANGES
ROCKY MOUNTAINS
PORCUPINE FLATS
BRITISH COLUMBIA

Road and rail routes in the Hanington Visual Unit would be associated with moderate to high visual impacts because of the presence of steep slopes and continuous and uniform forest cover.

Mount Carr-Hilton and adjacent mountains would be excellent focal points for views from a highway in the Narraway Visual Unit.

Jarvis Lakes, in association with the surrounding alpine landscapes, provide an outstanding scenic and recreational experience.

Road and rail routes in the Porcupine Visual Unit would be associated with low visual impacts, due to the presence of even terrain and varied vegetation patterns.

FIGURE 7.8. JARVIS

LEGEND

TRANSPORT ROUTE OPTIONS

━━━━	TRANSPORT CORRIDOR BOUNDARY
────	PROPOSED HIGHWAY ROUTE
─┼─┼─┼─	PROPOSED RAILWAY ROUTE
– – – –	ALTERNATIVE HIGHWAY ROUTE (based on visual analysis)
┼ ┼ ┼ ┼	ALTERNATIVE RAILWAY ROUTE (based on visual analysis)
──┼───┼──	PROPOSED JOINT HIGHWAY/RAILWAY ROUTE

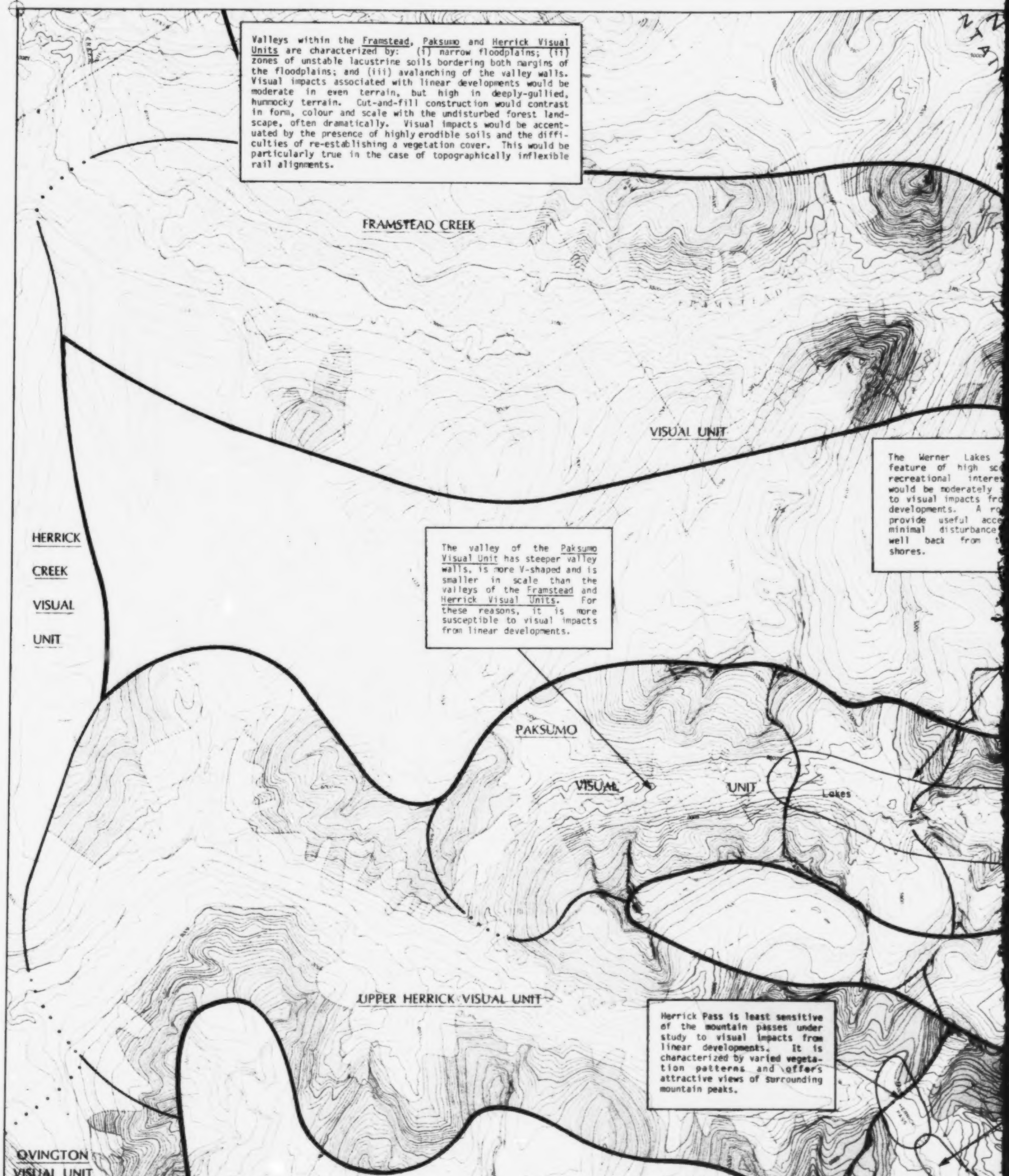
VISUAL ANALYSIS

────	VISUAL UNIT BOUNDARY
─······─	PORTAL IN VISUAL UNIT BOUNDARY
JARVIS VISUAL UNIT	NAME OF VISUAL UNIT
⬭	LOCATION OF VISUAL SIGNIFICANCE

TERRAIN ANALYSIS

	HAZARDOUS TERRAIN – broad or linear avalanche zone
	SENSITIVE TERRAIN – silts and lacustrine soils presently subject to failure, gullying, piping and/or erosion
- - - -	INTERPOLATED TERRAIN UNIT BOUNDARY

Base map created from N.T.S. 1:50 000 maps provided by Surveys and Mapping Branch, Ministry of Environment, Victoria, B.C.

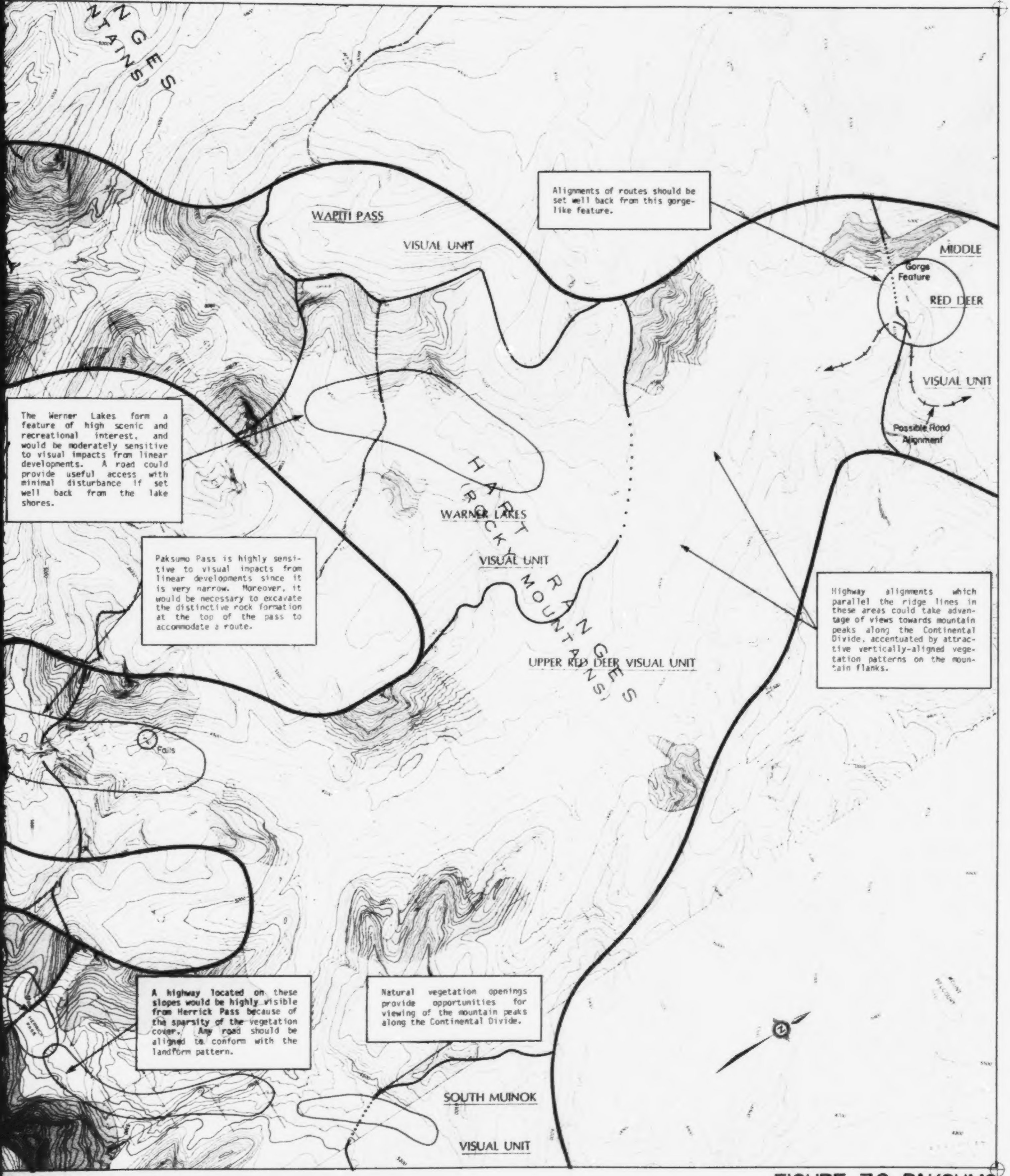


Valleys within the Framstead, Paksumo and Herrick Visual Units are characterized by: (i) narrow floodplains; (ii) zones of unstable lacustrine soils bordering both margins of the floodplains; and (iii) avalanching of the valley walls. Visual impacts associated with linear developments would be moderate in even terrain, but high in deeply-gullied, hummocky terrain. Cut-and-fill construction would contrast in form, colour and scale with the undisturbed forest landscape, often dramatically. Visual impacts would be accentuated by the presence of highly erodible soils and the difficulties of re-establishing a vegetation cover. This would be particularly true in the case of topographically inflexible rail alignments.

The Werner Lakes
feature of high sc
recreational interes
would be moderately s
to visual impacts fro
developments. A ro
provide useful acce
minimal disturbance
well back from t
shores.

The valley of the Paksumo Visual Unit has steeper valley walls, is more V-shaped and is smaller in scale than the valleys of the Framstead and Herrick Visual Units. For these reasons, it is more susceptible to visual impacts from linear developments.

Herrick Pass is least sensitive of the mountain passes under study to visual impacts from linear developments. It is characterized by varied vegetation patterns and offers attractive views of surrounding mountain peaks.


NGES
NTAINS)
WAPITI PASS
VISUAL UNIT
MIDDLE
Gorge Feature
RED DEER
VISUAL UNIT
Possible Road Alignment
HART RANGES
(ROCKY MOUNTAINS)
WARNER LAKES
VISUAL UNIT
UPPER RED DEER VISUAL UNIT
Falls
SOUTH MUINOK
VISUAL UNIT
N

Alignments of routes should be set well back from this gorge-like feature.

The Werner Lakes form a feature of high scenic and recreational interest, and would be moderately sensitive to visual impacts from linear developments. A road could provide useful access with minimal disturbance if set well back from the lake shores.

Paksumo Pass is highly sensitive to visual impacts from linear developments since it is very narrow. Moreover, it would be necessary to excavate the distinctive rock formation at the top of the pass to accommodate a route.

Highway alignments which parallel the ridge lines in these areas could take advantage of views towards mountain peaks along the Continental Divide, accentuated by attractive vertically-aligned vegetation patterns on the mountain flanks.

A highway located on these slopes would be highly visible from Herrick Pass because of the sparsity of the vegetation cover. Any road should be aligned to conform with the landform pattern.

Natural vegetation openings provide opportunities for viewing of the mountain peaks along the Continental Divide.

FIGURE 7.9. PAKSUMO

LEGEND

TRANSPORT ROUTE OPTIONS

━━━━	TRANSPORT CORRIDOR BOUNDARY
────	PROPOSED HIGHWAY ROUTE
─┼─┼─┼─	PROPOSED RAILWAY ROUTE
– – – –	ALTERNATIVE HIGHWAY ROUTE (based on visual analysis)
+-+-+-+	ALTERNATIVE RAILWAY ROUTE (based on visual analysis)
──┼──┼──	PROPOSED JOINT HIGHWAY/RAILWAY ROUTE

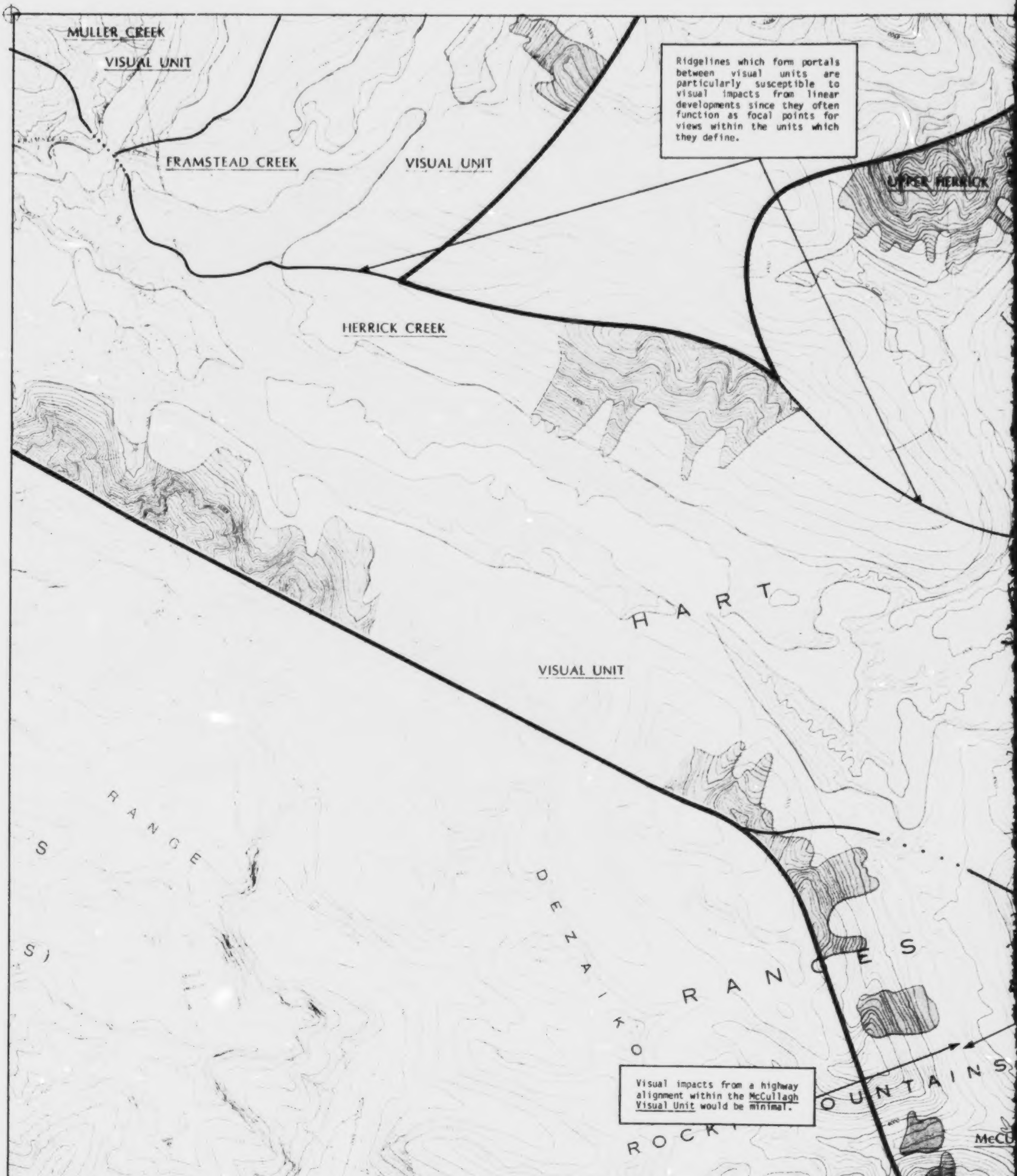
VISUAL ANALYSIS

────	VISUAL UNIT BOUNDARY
—·······—	PORTAL IN VISUAL UNIT BOUNDARY
JARVIS VISUAL UNIT	NAME OF VISUAL UNIT
▭	LOCATION OF VISUAL SIGNIFICANCE

TERRAIN ANALYSIS

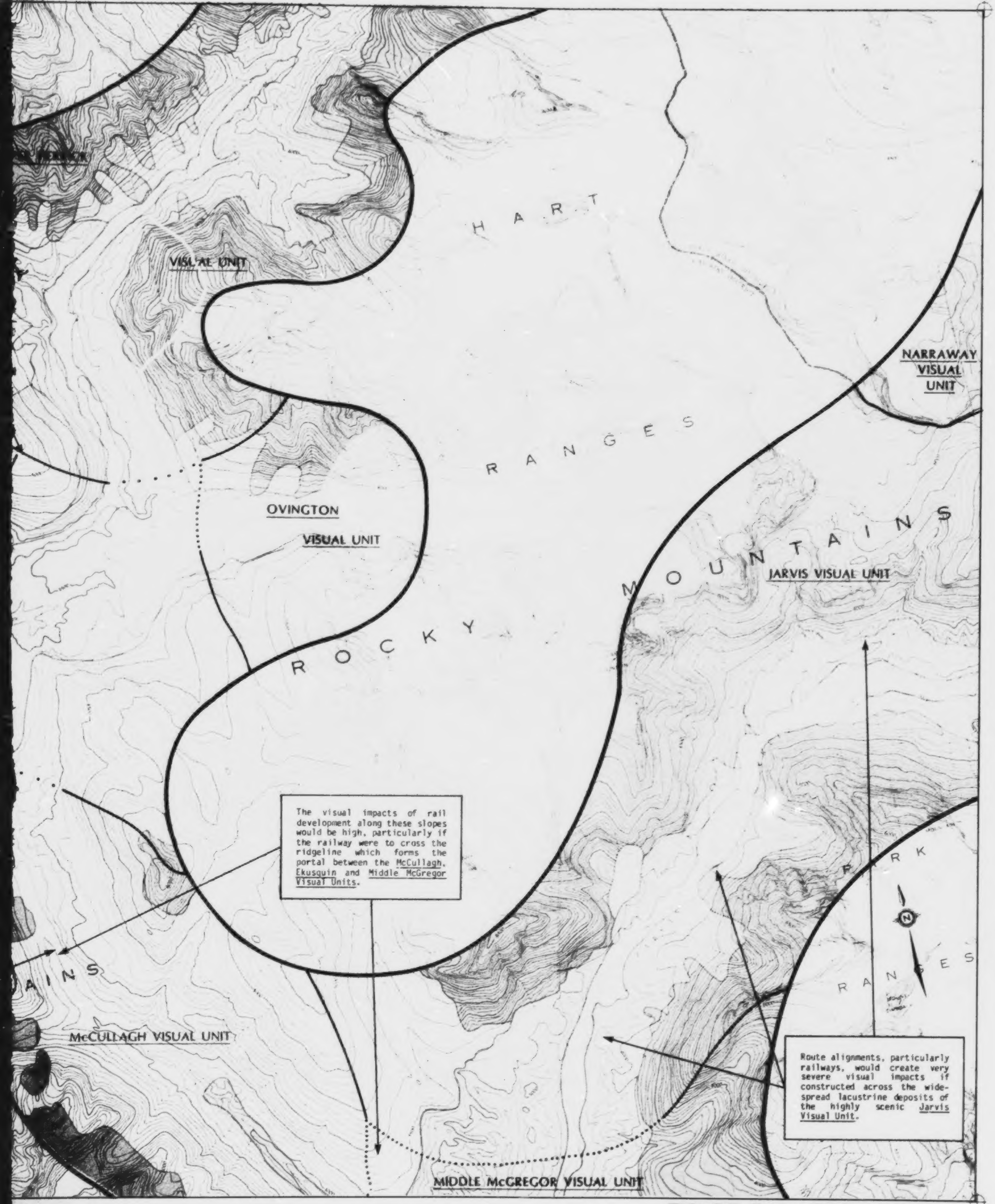
▒	HAZARDOUS TERRAIN - broad or linear avalanche zone
░	SENSITIVE TERRAIN - silts and lacustrine soils presently subject to failure, gullying, piping and/or erosion
- - - -	INTERPOLATED TERRAIN UNIT BOUNDARY

Base map created from N.T.S. 1:50 000 maps provided by Surveys and Mapping Branch, Ministry of Environment, Victoria, B.C.


MULLER CREEK
VISUAL UNIT
FRAMSTEAD CREEK
VISUAL UNIT
UPPER HERRICK
HERRICK CREEK
HART
VISUAL UNIT
RANGE
DEZAIKO
RANGES
ROCKY MOUNTAINS
RAN
McCU

Ridgelines which form portals between visual units are particularly susceptible to visual impacts from linear developments since they often function as focal points for views within the units which they define.

Visual impacts from a highway alignment within the McCullagh Visual Unit would be minimal.


HERRICK
VISUAL UNIT
H A R T
R A N G E S
NARRAWAY VISUAL UNIT
OVINGTON VISUAL UNIT
R O C K Y M O U N T A I N S
JARVIS VISUAL UNIT
AINS
McCULLAGH VISUAL UNIT
MIDDLE McGREGOR VISUAL UNIT
P A R K R A N G E S
N

The visual impacts of rail development along these slopes would be high, particularly if the railway were to cross the ridgeline which forms the portal between the McCullagh, Ekusquin and Middle McGregor Visual Units.

Route alignments, particularly railways, would create very severe visual impacts if constructed across the widespread lacustrine deposits of the highly scenic Jarvis Visual Unit.

FIGURE 7.10. UPPER HERRICK

LEGEND

TRANSPORT ROUTE OPTIONS

━━━━	TRANSPORT CORRIDOR BOUNDARY
────	PROPOSED HIGHWAY ROUTE
─┼─┼─┼─	PROPOSED RAILWAY ROUTE
– – – –	ALTERNATIVE HIGHWAY ROUTE (based on visual analysis)
+ + + +	ALTERNATIVE RAILWAY ROUTE (based on visual analysis)
─┼───┼─	PROPOSED JOINT HIGHWAY/RAILWAY ROUTE

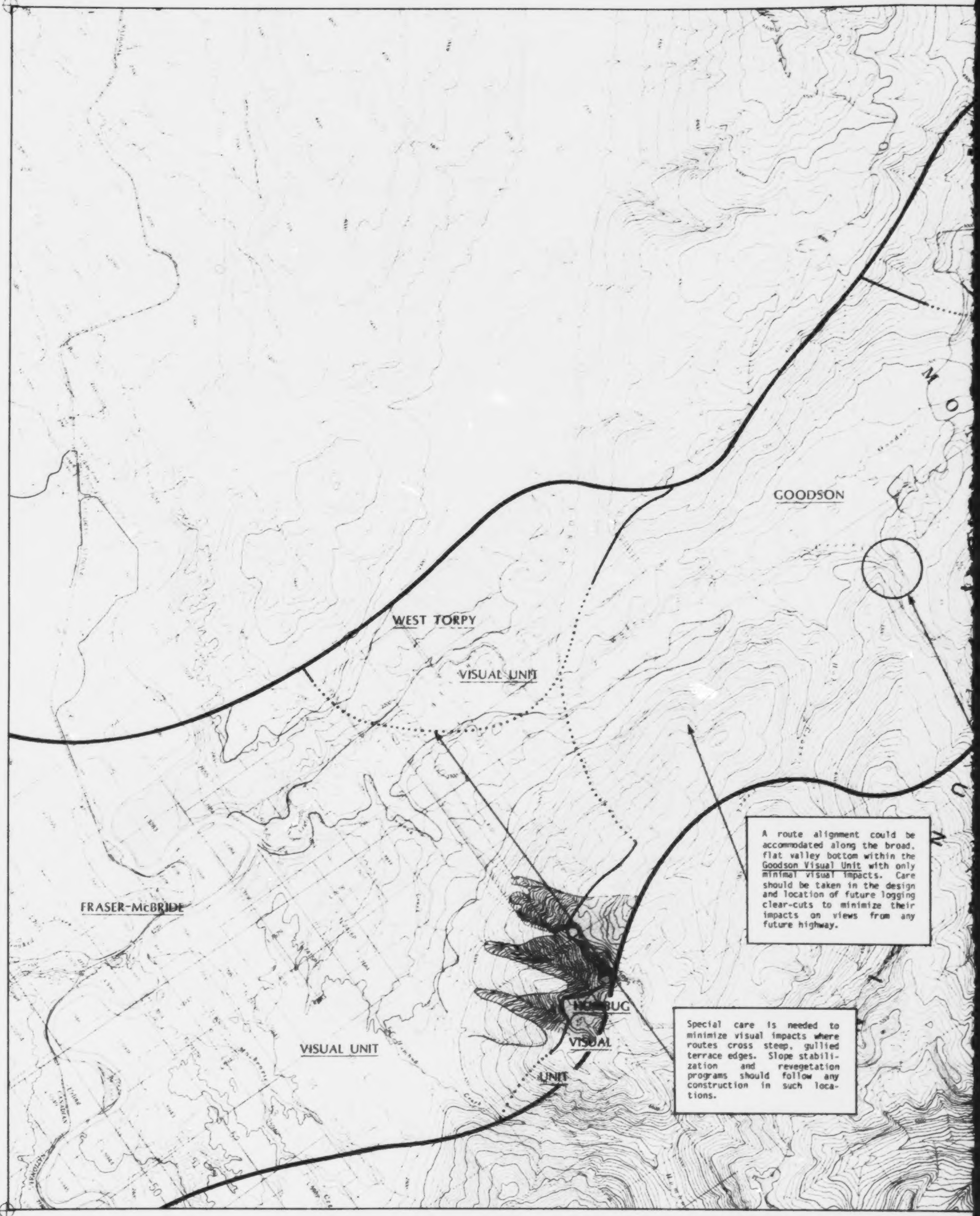
VISUAL ANALYSIS

────	VISUAL UNIT BOUNDARY
—·······—	PORTAL IN VISUAL UNIT BOUNDARY
JARVIS VISUAL UNIT	NAME OF VISUAL UNIT
⬭	LOCATION OF VISUAL SIGNIFICANCE

TERRAIN ANALYSIS

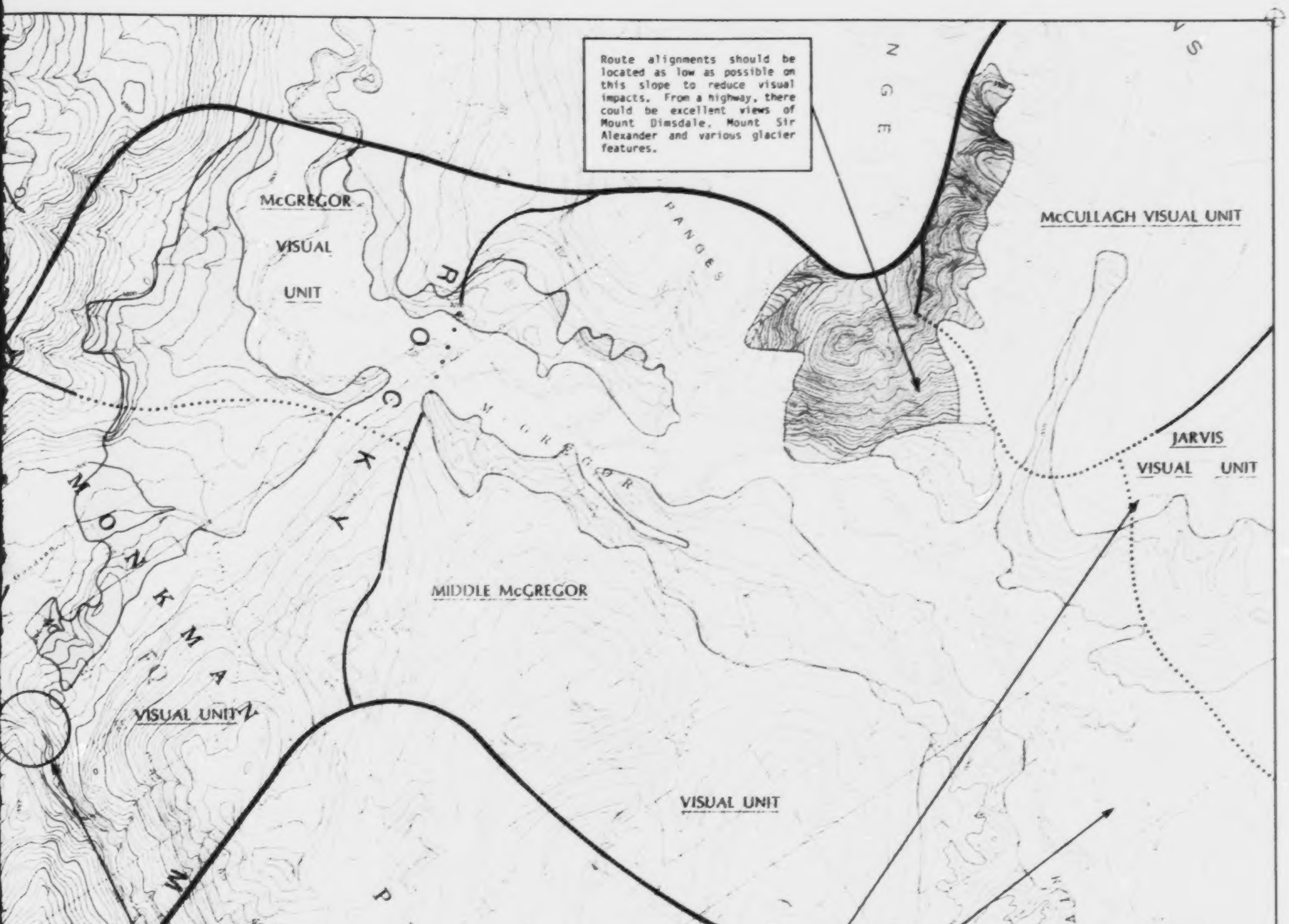
▨	HAZARDOUS TERRAIN – broad or linear avalanche zone
░	SENSITIVE TERRAIN – silts and lacustrine soils presently subject to failure, gullying, piping and/or erosion
- - - - -	INTERPOLATED TERRAIN UNIT BOUNDARY

Base map created from N.T.S. 1:50 000 maps provided by Surveys and Mapping Branch, Ministry of Environment, Victoria, B.C.


WEST TORPY
VISUAL UNIT
GOODSON
FRASER-McBRIDE
VISUAL UNIT
HUMBUG
VISUAL
UNIT

A route alignment could be accommodated along the broad, flat valley bottom within the Goodson Visual Unit with only minimal visual impacts. Care should be taken in the design and location of future logging clear-cuts to minimize their impacts on views from any future highway.

Special care is needed to minimize visual impacts where routes cross steep, gullied terrace edges. Slope stabilization and revegetation programs should follow any construction in such locations.


McGREGOR VISUAL UNIT
McCULLAGH VISUAL UNIT
JARVIS VISUAL UNIT
MIDDLE McGREGOR VISUAL UNIT
MONKMAN VISUAL UNIT
ROCKY
RANGES
McGREGOR
RIVER
MONKMAN PROVINCIAL PARK

Route alignments should be located as low as possible on this slope to reduce visual impacts. From a highway, there could be excellent views of Mount Dimsdale, Mount Sir Alexander and various glacier features.

Care should be taken to ensure that the visual integrity of this highly scenic gorge feature along Walker Creek is not degraded by logging operations.

could be
he broad,
ithin the
with only
ts. Care
he design
e logging
ze their
from any

The sinuous channel of the McGregor River, when viewed against the massive mountain and glacier landscape between the Jarvis and Kitchi Creek valleys, offers the most spectacular viewscape within any of the proposed transportation corridors under study. This viewscape can only be preserved given careful management of logging and road and rail construction activities.

Any railway loop extending into the Jarvis Visual Unit and traversing the lacustrine terrain below Mount Dimsdale and Mount Sir Alexander will severely degrade the presently outstanding visual quality of the area (see Figure 7.3. for potential rail alignment).

FIGURE 7.11. GOODSON

LEGEND

TRANSPORT ROUTE OPTIONS

━━━━	TRANSPORT CORRIDOR BOUNDARY
————	PROPOSED HIGHWAY ROUTE
—+—+—+—	PROPOSED RAILWAY ROUTE
– – – –	ALTERNATIVE HIGHWAY ROUTE (based on visual analysis)
++++	ALTERNATIVE RAILWAY ROUTE (based on visual analysis)
—+——+—	PROPOSED JOINT HIGHWAY/RAILWAY ROUTE

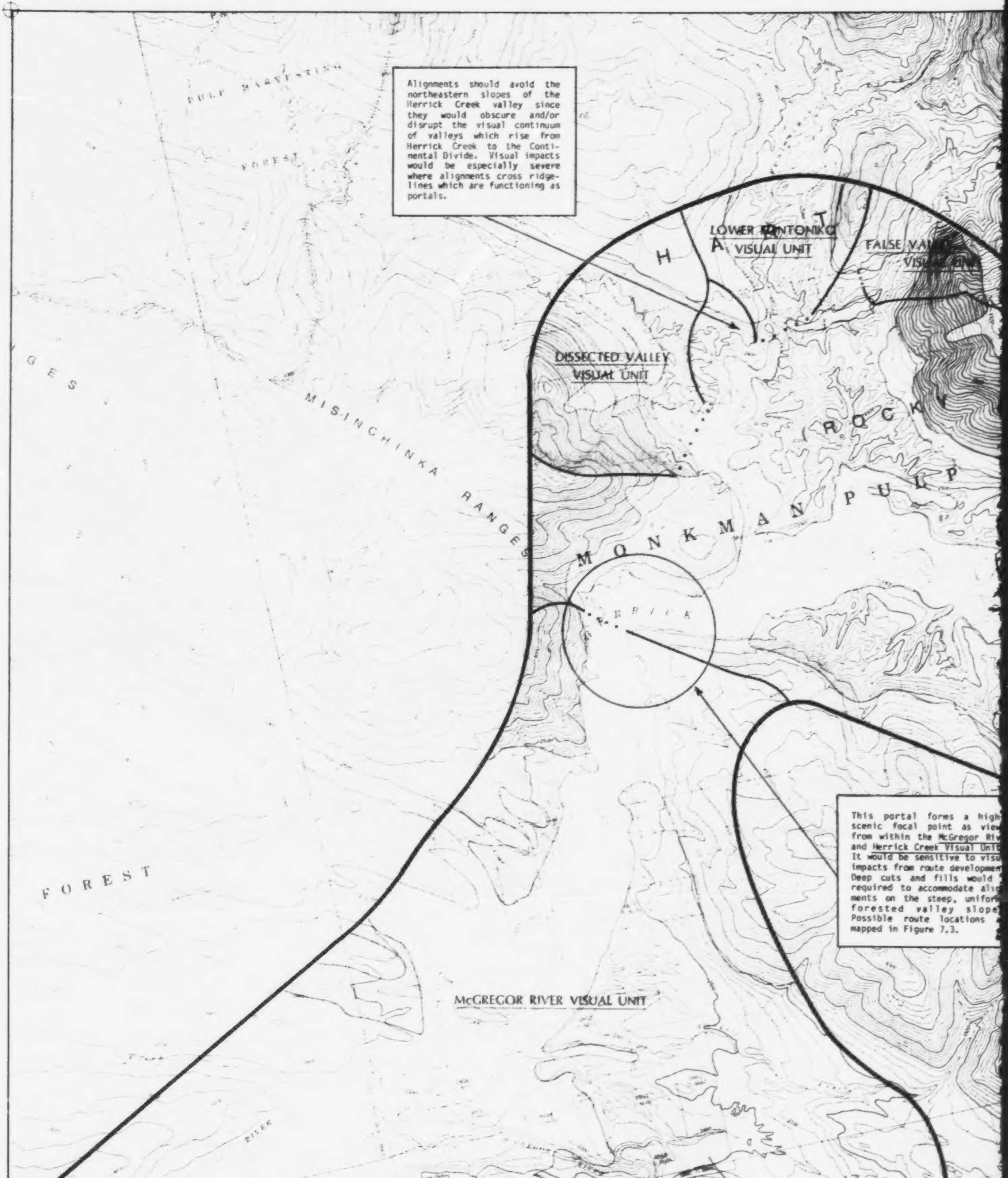
VISUAL ANALYSIS

————	VISUAL UNIT BOUNDARY
—······—	PORTAL IN VISUAL UNIT BOUNDARY
JARVIS VISUAL UNIT	NAME OF VISUAL UNIT
⬭	LOCATION OF VISUAL SIGNIFICANCE

TERRAIN ANALYSIS

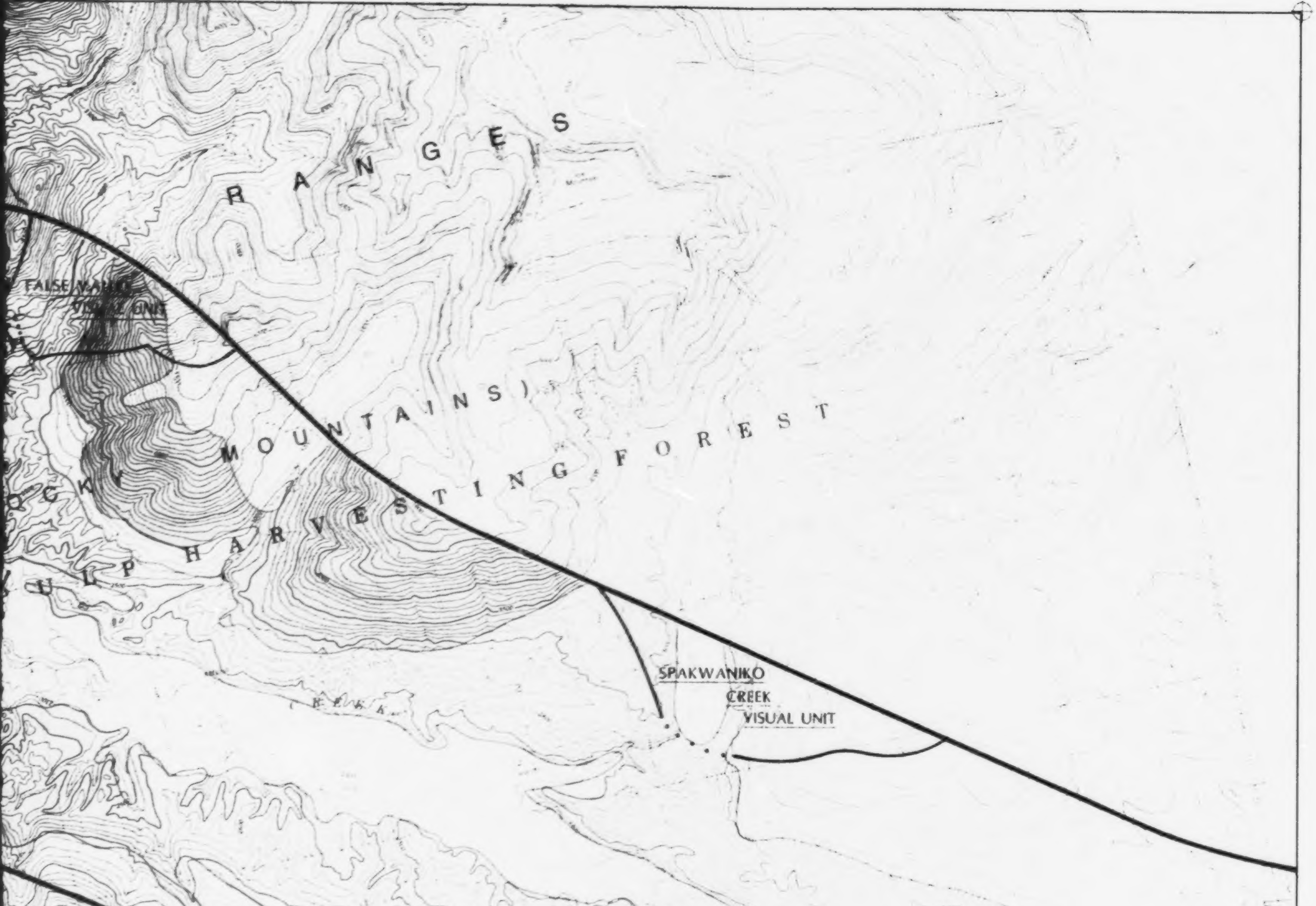
▨	HAZARDOUS TERRAIN - broad or linear avalanche zone
	SENSITIVE TERRAIN - silts and lacustrine soils presently subject to failure, gullying, piping and/or erosion
– – –	INTERPOLATED TERRAIN UNIT BOUNDARY

Base map created from N. T. S. 1:50 000 maps provided by Surveys and Mapping Branch, Ministry of Environment, Victoria, B. C.


PULP HARVESTING
FOREST
GES
MISINCHINKA RANGES
H A T
LOWER KINTONIKO VISUAL UNIT
FALSE VALLEY VISUAL UNIT
DISSECTED VALLEY VISUAL UNIT
ROCKY
MONKMAN PULP
HERRICK
FOREST
McGREGOR RIVER VISUAL UNIT
RIVER
McGREGOR

Alignments should avoid the northeastern slopes of the Herrick Creek valley since they would obscure and/or disrupt the visual continuum of valleys which rise from Herrick Creek to the Continental Divide. Visual impacts would be especially severe where alignments cross ridgelines which are functioning as portals.

This portal forms a high
scenic focal point as view
from within the McGregor Riv
and Herrick Creek Visual Unit
It would be sensitive to visu
impacts from route developmen
Deep cuts and fills would
required to accommodate alig
ments on the steep, unifor
forested valley slope
Possible route locations
mapped in Figure 7.3.


RANGES
OCKY MOUNTAINS)
ULP HARVESTING FOREST
FALSE WAHKO
VISUAL UNIT
SPAKWANIKO
CREEK
VISUAL UNIT
REEK
HERRICK CREEK VISUAL UNIT
RANGE

his portal forms a highly
cenic focal point as viewed
rom within the McGregor River
and Herrick Creek Visual Units.
t would be sensitive to visual
mpacts from route development.
eep cuts and fills would be
equired to accommodate align-
ents on the steep, uniformly
orested valley slopes.
ossible route locations are
apped in Figure 7.3.

FIGURE 7.12. LOWER HERRICK

LEGEND

TRANSPORT ROUTE OPTIONS

━━━━	TRANSPORT CORRIDOR BOUNDARY
────	PROPOSED HIGHWAY ROUTE
─┼─┼─┼─	PROPOSED RAILWAY ROUTE
– – – –	ALTERNATIVE HIGHWAY ROUTE (based on visual analysis)
++++	ALTERNATIVE RAILWAY ROUTE (based on visual analysis)
──┼──┼──	PROPOSED JOINT HIGHWAY/RAILWAY ROUTE

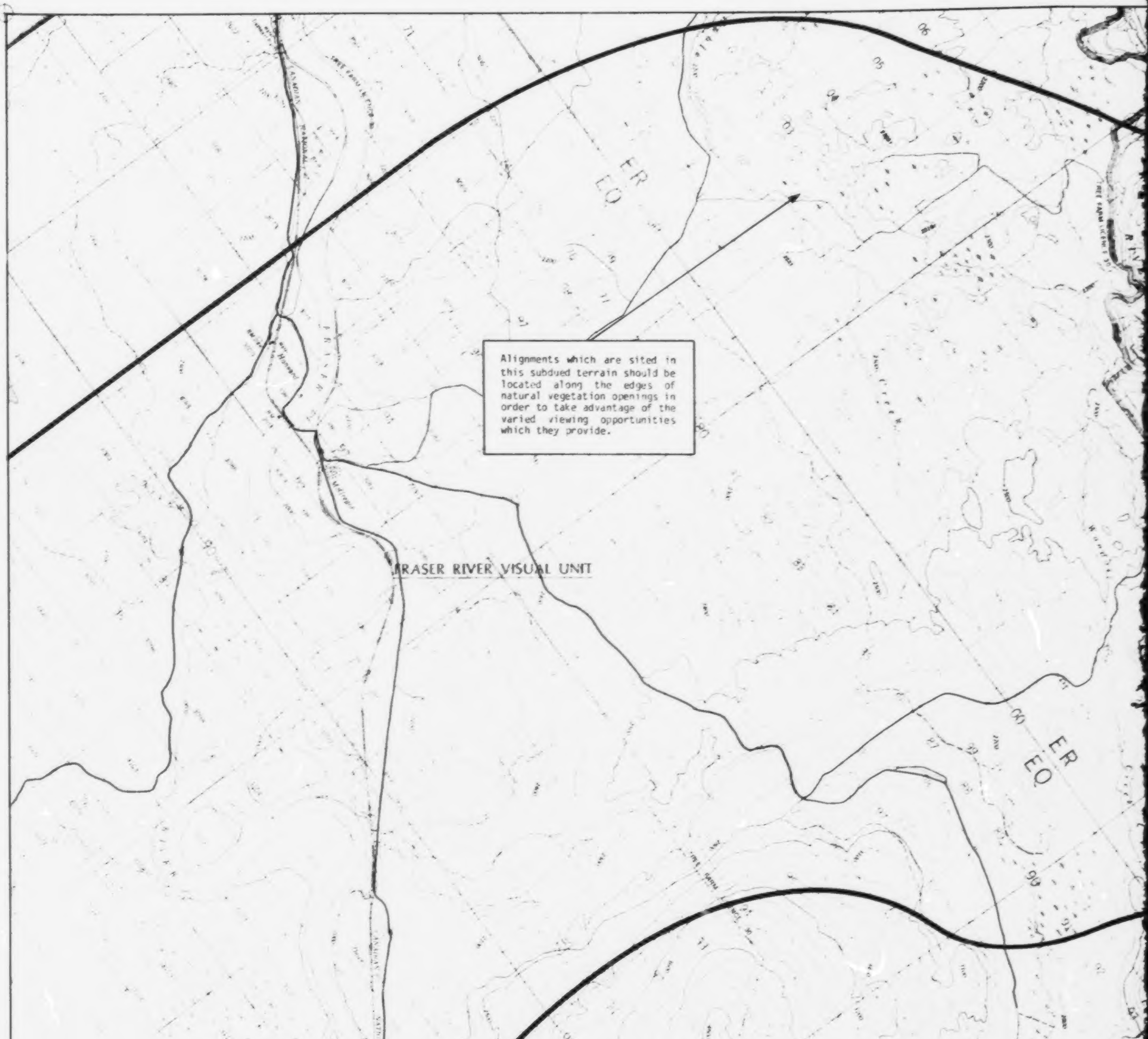
VISUAL ANALYSIS

────	VISUAL UNIT BOUNDARY
—·······—	PORTAL IN VISUAL UNIT BOUNDARY
JARVIS VISUAL UNIT	NAME OF VISUAL UNIT
⬭	LOCATION OF VISUAL SIGNIFICANCE

TERRAIN ANALYSIS

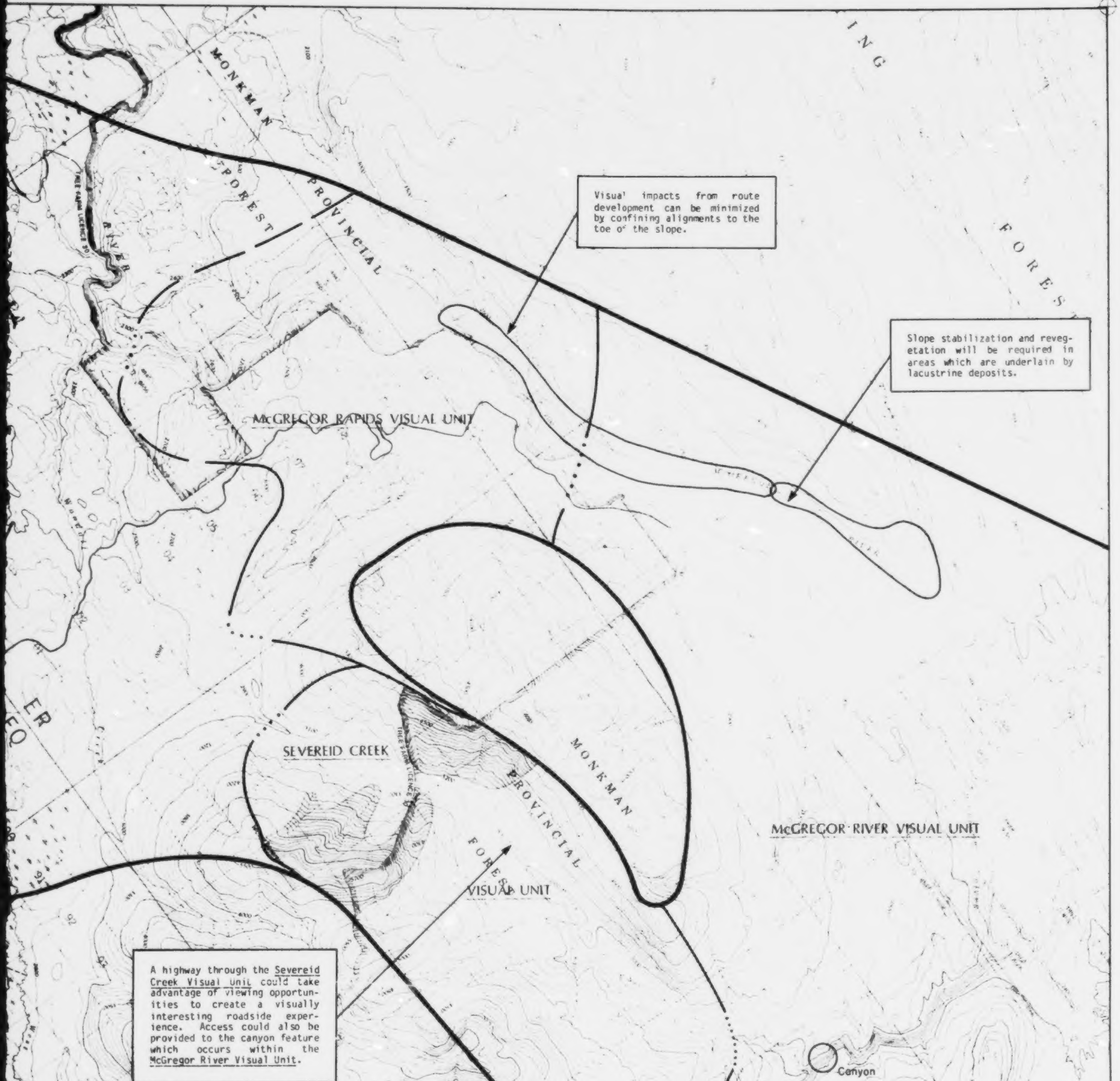
▨	HAZARDOUS TERRAIN - broad or linear avalanche zone
░	SENSITIVE TERRAIN - silts and lacustrine soils presently subject to failure, gullying, piping and/or erosion
– – – –	INTERPOLATED TERRAIN UNIT BOUNDARY

Base map created from N. T. S. 1:50 000 maps provided by Surveys and Mapping Branch, Ministry of Environment, Victoria, B. C.



FRASER RIVER VISUAL UNIT
ER
EQ
ER
EQ
FRASER
RIDGE

Alignments which are sited in this subdued terrain should be located along the edges of natural vegetation openings in order to take advantage of the varied viewing opportunities which they provide.


MONKMAN PROVINCIAL FOREST
McGREGOR RAPIDS VISUAL UNIT
SEVEREID CREEK VISUAL UNIT
MONKMAN PROVINCIAL FOREST
McGREGOR RIVER VISUAL UNIT
Canyon
FOREST
ING
N

Visual impacts from route development can be minimized by confining alignments to the toe of the slope.

Slope stabilization and revegetation will be required in areas which are underlain by lacustrine deposits.

A highway through the Severeid Creek Visual unit could take advantage of viewing opportunities to create a visually interesting roadside experience. Access could also be provided to the canyon feature which occurs within the McGregor River Visual Unit.

FIGURE 7.13. McGREGOR

chapter eight

8 VISUAL EVALUATION OF PROPOSED TOWNSITES

8.1. TOWNSITE COMPARISON

The proposed townsites are located in close proximity to one another within the Narraway visual unit (see Figures 7.7. and 8.1.). The area displays moderate visual quality, and is moderately vulnerable to negative visual impacts since clearing for development will be highly conspicuous within the uniform forest canopy. The townsites are illustrated in Plates 8.1. to 8.3. below, and characteristics pertinent to the visual assessment of the townsites are summarized in Table 8.1., which follows.

Plate 8.1.
Nekik townsite, viewed from the west.

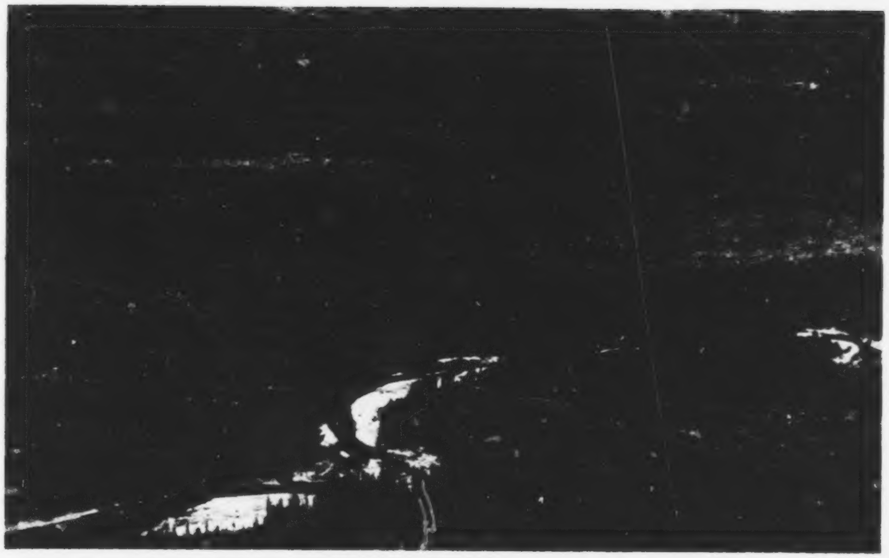


Plate 8.2.
Narraway townsite, viewed from the south.

Plate 8.3.
Saxon townsite, viewed from the southwest.

TABLE 8.1.

COMPARISON OF TOWNSITE CHARACTERISTICS

VISUAL CONSIDERATION	NEKIK TOWNSITE	NARRAWAY TOWNSITE	SAXON TOWNSITE
Visual quality	- moderate	- moderate	- moderate
Topography	- gently sloping, terraced	- relatively flat, terraced	- undulating, irregular
Vulnerability to visual impact	- moderate	- moderate	- moderate
Aspect	- northwest	- south	- south
Viewing Opportunities	- good viewing opportunities from the terrace edges to Nekik Mountain and up the Narraway valley to Mount Carr-Hilton	- viewing opportunities to Nekik Mountain and Saxon Ridge; clearing will be required to open views to these areas	- viewing opportunity to Saxon Ridge and to the Narraway River Canyon
Scenic features within, or adjacent to, the townsite	- Narraway River accessible, although separated by a steep terrace slope - fens	- Narraway River, accessible from the townsite area	- Narraway River, adjacent to the townsite, located in a deep canyon - a small marsh/lake is located within the townsite area
Impact of minesite activities	- moderate	- high due to the potential location of a coal washing plant on the Narraway River at the townsite; also due to the potential siting of a rail spur across Saxon Ridge	- high due to the potential siting of a railway spur

8.2. TOWNSITE EVALUATION

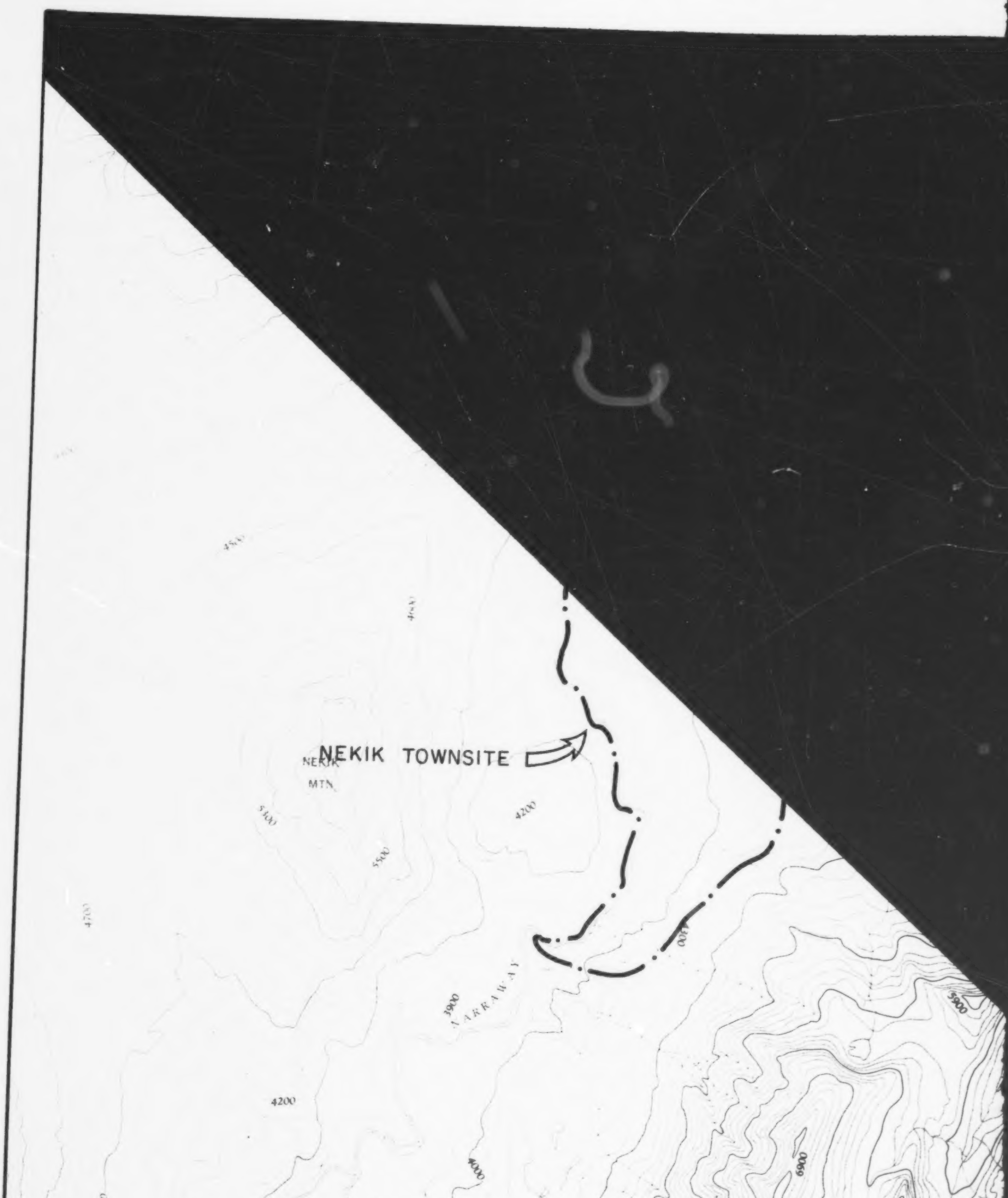
Table 8.1. indicates that the only two significant visual differences between the three townsite alternatives are connected with site orientation (or aspect) and with potential impacts from minesite development. It is felt that the potentially high impact of minesite development can be largely mitigated by designing vegetation openings to direct views away from the minesite and adjacent industrial development areas. Assuming that this is a reasonable expectation, aspect is considered to be the most important visual factor in ranking the three townsites in order of preference.

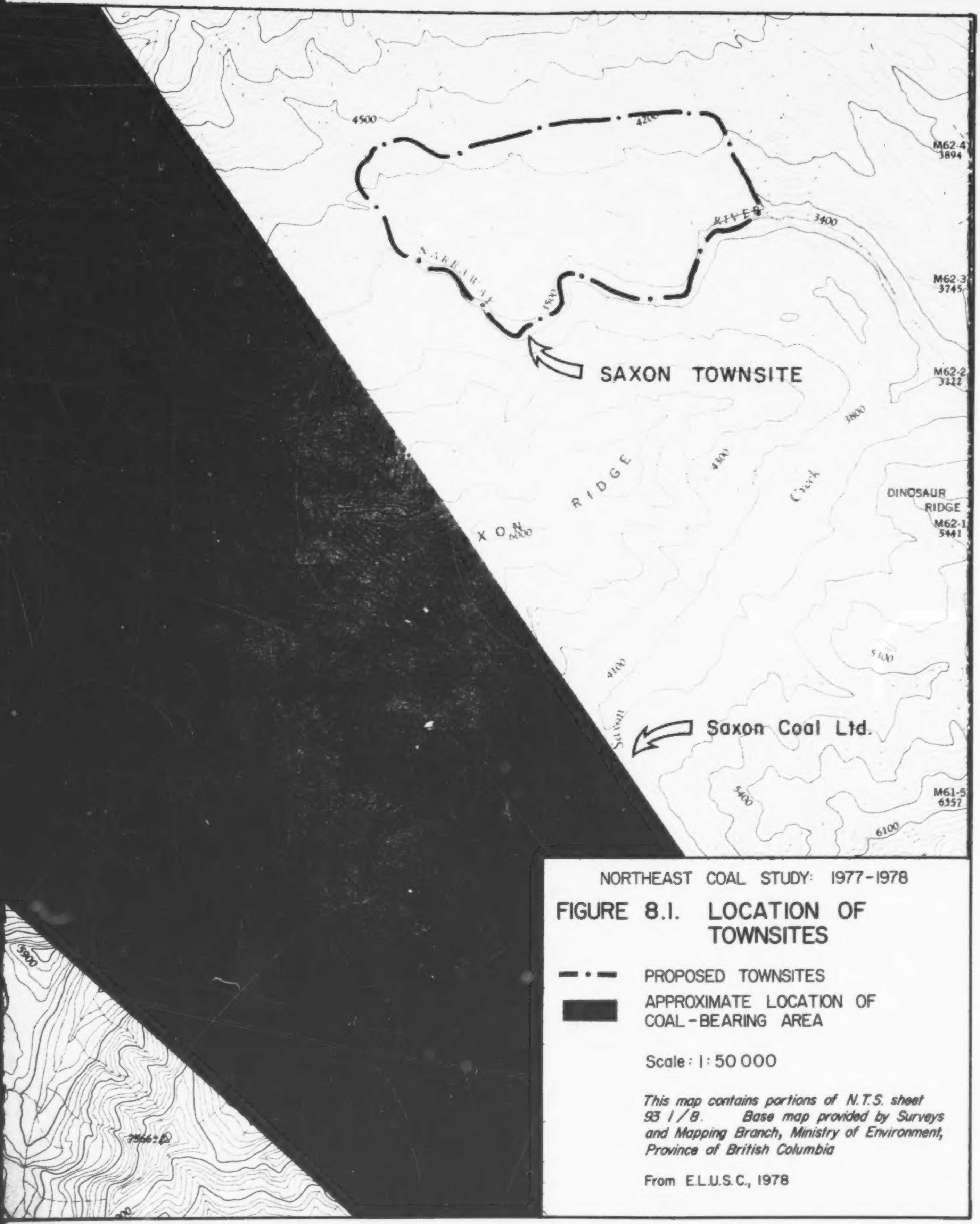
As has been pointed out previously (ELUSC, 1978), the Narraway townsite is exposed to more sunlight than the Saxon townsite since the latter is partially shaded by Saxon Ridge. The Nekik townsite, with its northwest aspect, is exposed to less total sunlight than either of the other two townsites.

The relatively flat terrain in the Narraway townsite also makes it possible to utilize the forest cover to screen industrial activity within, and adjacent to, the townsite, to open views to Nekik Mountain, and to clear openings to permit maximum penetration of sunlight. It is particularly important, should this site be developed, that clearing be carried out in accordance with a coordinated townsite development plan.

The townsites are ranked in the following order of preference:

Narraway townsite - most preferred
Saxon townsite - intermediate choice
Nekik townsite - least preferred


NEKIK TOWNSITE
NEKIK
MTN
4500
4600
5300
5500
4200
4700
4400
3900
NARRAWAY
4200
4000
4500
R
Huntington
6900
5900


4500
4200
M62-4
3894
RIVER
3400
NARRAWAY
3500
M62-3
3745
SAXON TOWNSITE
M62-2
3222
3800
4300
RIDGE
Creek
DINOSAUR
RIDGE
M62-1
5441
X O N
6000
5300
4100
Saxon
Saxon Coal Ltd.
5400
M61-5
6357
6100
5900
7566±

NORTHEAST COAL STUDY: 1977-1978

FIGURE 8.1. LOCATION OF TOWNSITES

—·—	PROPOSED TOWNSITES
■	APPROXIMATE LOCATION OF COAL-BEARING AREA

Scale: 1:50 000

This map contains portions of N.T.S. sheet 93 I/8. Base map provided by Surveys and Mapping Branch, Ministry of Environment, Province of British Columbia

From E.L.U.S.C., 1978

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appendices

A METHODOLOGY FOR VISUAL UNIT ANALYSIS

A.1. VISUAL UNIT MAPPING

A.1.1. VISUAL UNIT BOUNDARIES

The concept of the visual unit as a bounded space requires that topography be the dominant criterion for mapping unit boundaries. These normally follow major ridgelines and enclosing spurs, or marked changes in topographic character. Selection of unit boundaries in complex or subdued terrain is made easier by referring to watershed limits; flowing water becomes a powerful unifying force in those cases where ridge enclosure is not readily apparent.

Visual units are seldom completely enclosed. It is common to find at least one or two openings or portals where the skyline dips to provide a threshold for drainage, access or views outward. Portals are important for observer orientation and for potential movement into or through the unit. The stereopair in Plate A.1. illustrates how unit boundaries and portals may be located relative to topography, while Figure A.1. depicts an oblique view of the same area.

Where a unit boundary coincides with the skyline along a prominent sharp ridge, this topographic eminence is indicated as shown in Plate A.2. and Figure A.2. More commonly, unit boundaries trace complex high ground, and present the appearance of a generalized enclosure from most points on the ground. In some locations, bounding ridges may be more or less concealed or indistinguishable for all or part of their length.

In valley units, it is often possible to map a "false" enclosure or rim, which is a visible, convex slope-break which intervenes between the valley floor and the unit boundary, and which separates the lower slopes from the foreshortened or invisible upper slopes or plateau. Where there is no definite and perceptible ridge-line, as in the example of a narrow, flat-topped ridge separating adjacent valley units, the boundary is assumed to occupy the centre of the ridge-top above the rim, and is shown as in Plate A.3. and Figure A.3. Where such flat-topped ridges or plateaux are expansive, they may be designated as units in their own right, dependent upon extent, configuration, and detail.

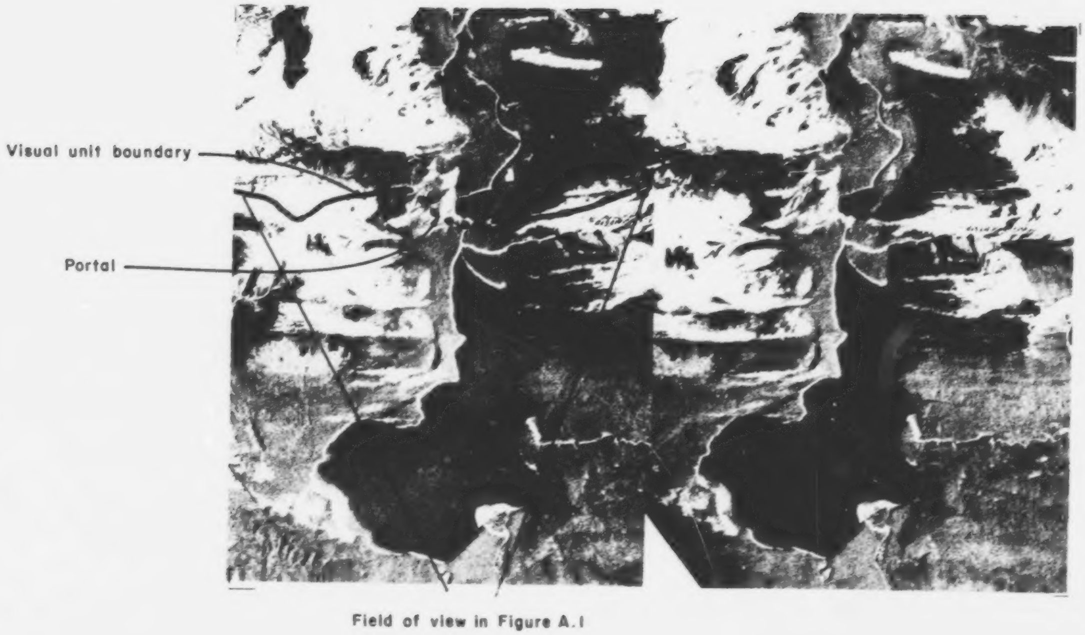
Visual unit boundary
Portal
Field of view in Figure A.I

Plate A.1.
Wapiti Lake: Stereopair Showing Visual Unit Boundaries

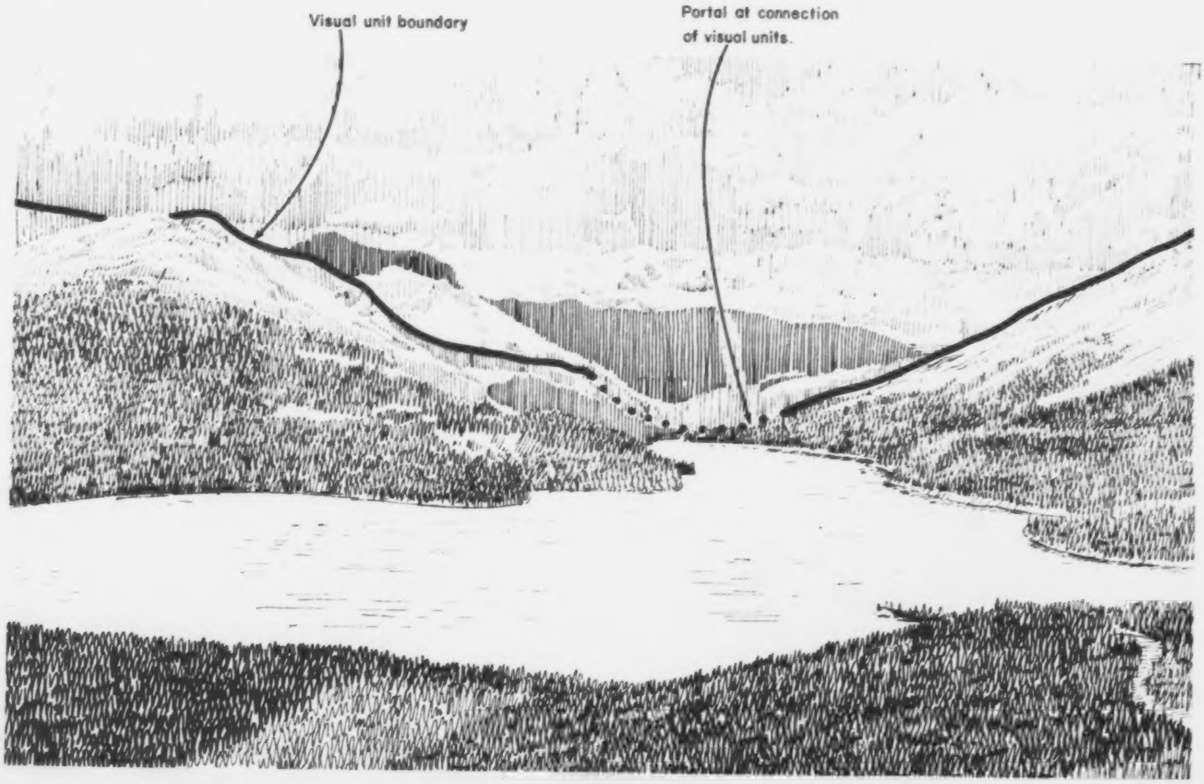
Visual unit boundary
Portal at connection of visual units.

FIGURE A.I. WAPITI LAKE: OBLIQUE VIEW SHOWING VISUAL UNIT BOUNDARIES

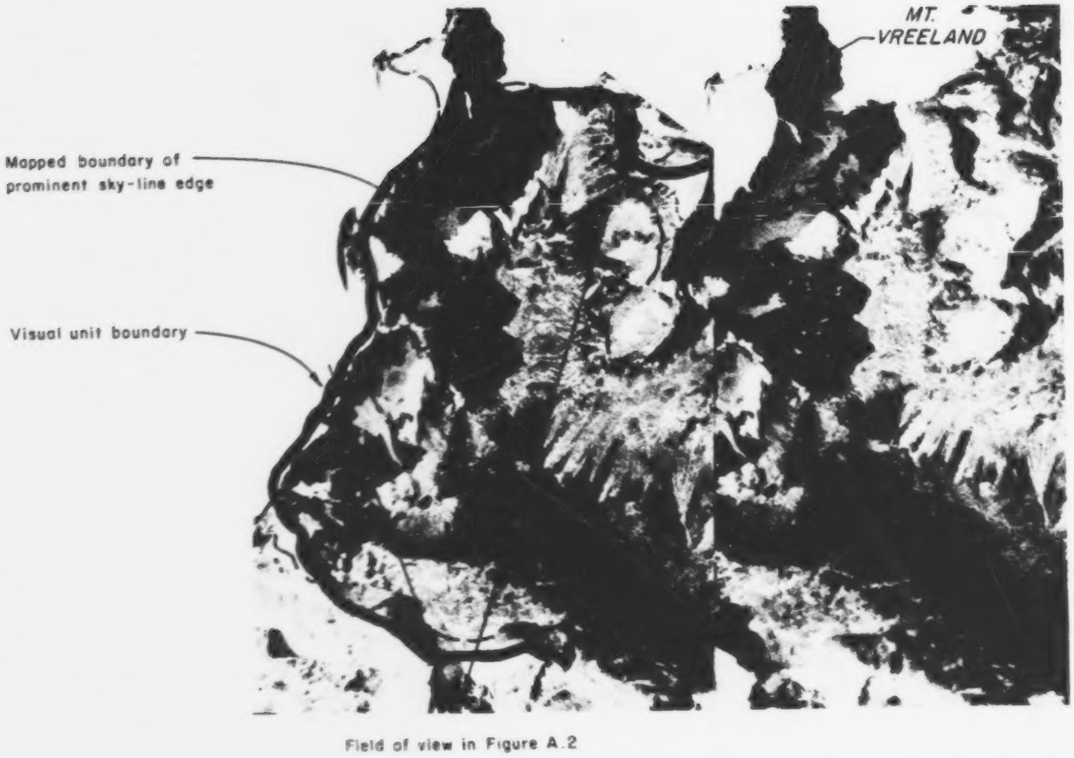
MT. VREELAND
Mapped boundary of prominent sky-line edge
Visual unit boundary
Field of view in Figure A.2

Plate A.2.
Mt. Vreeland: Stereopair Showing Prominent Skyline Edges

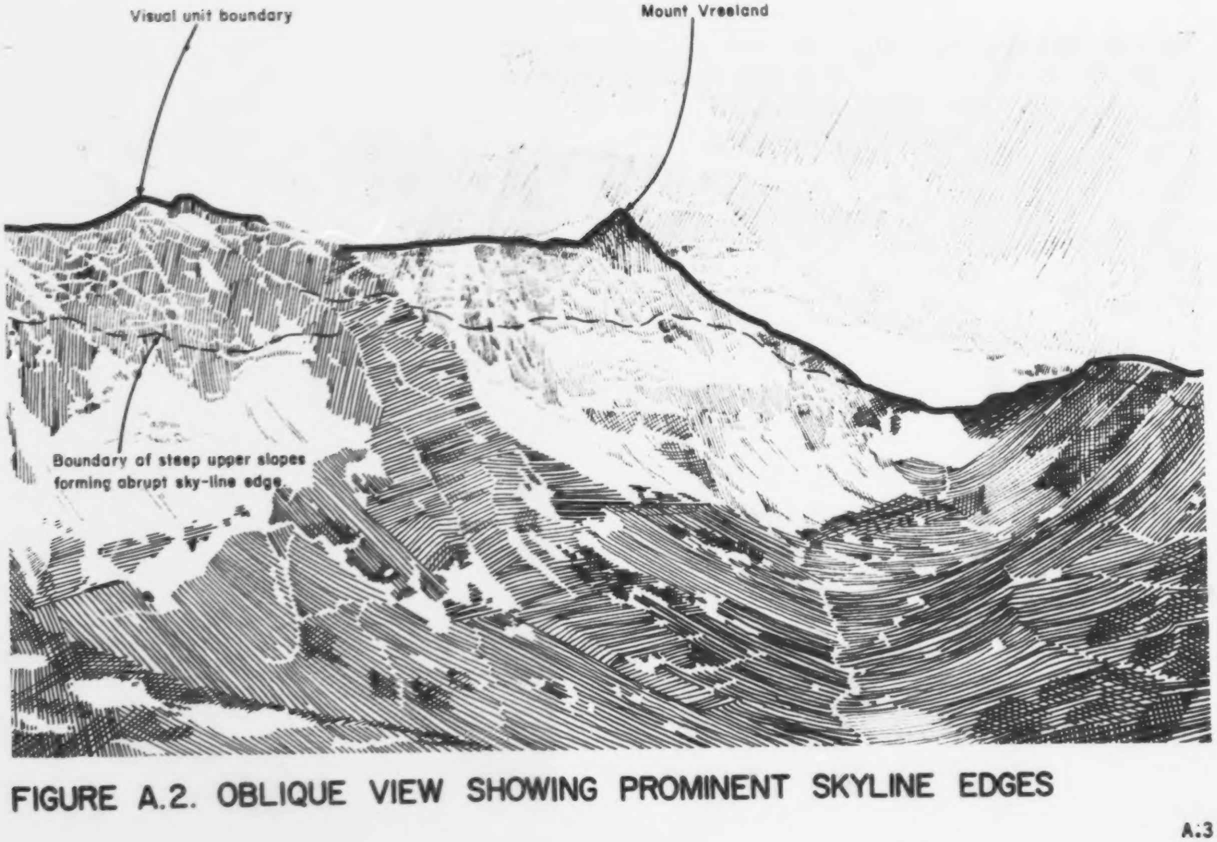
Visual unit boundary
Mount Vreeland
Boundary of steep upper slopes forming abrupt sky-line edge

FIGURE A.2. OBLIQUE VIEW SHOWING PROMINENT SKYLINE EDGES

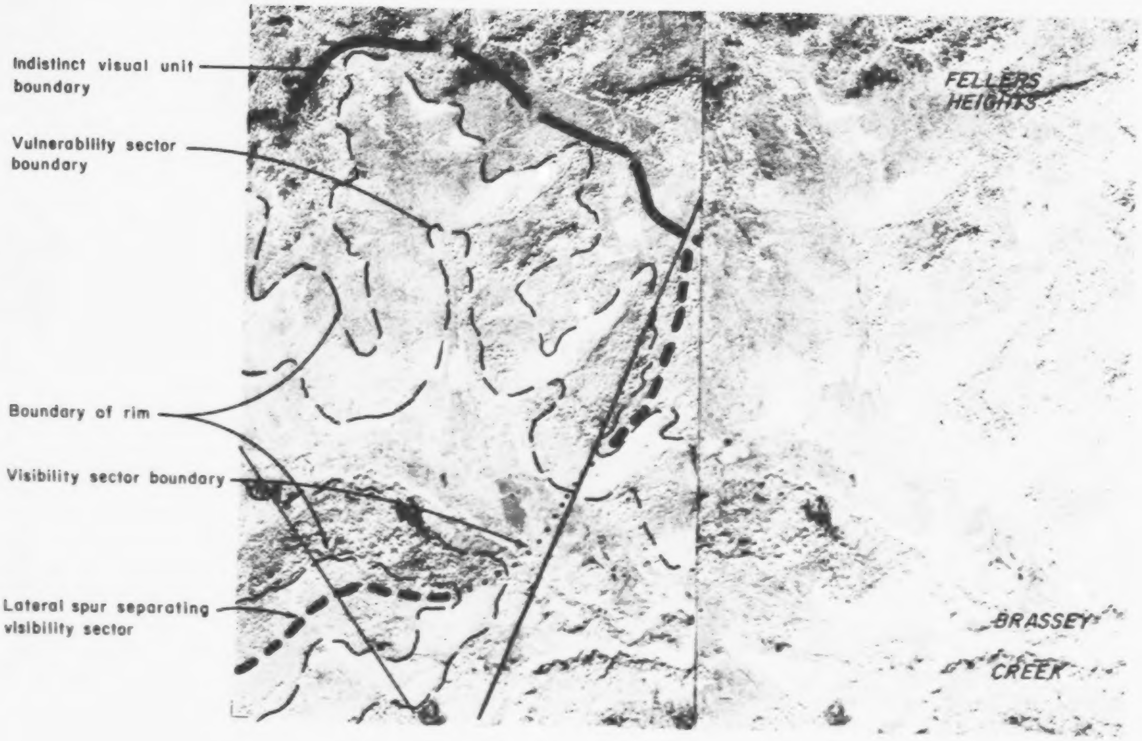
Indistinct visual unit boundary
Vulnerability sector boundary
Boundary of rim
Visibility sector boundary
Lateral spur separating visibility sector
FELLERS HEIGHTS
BRASSEY CREEK

Plate A.3.
Fellers Heights: Stereopair Showing Rims, Visibility Sectors, and Vulnerability Sectors

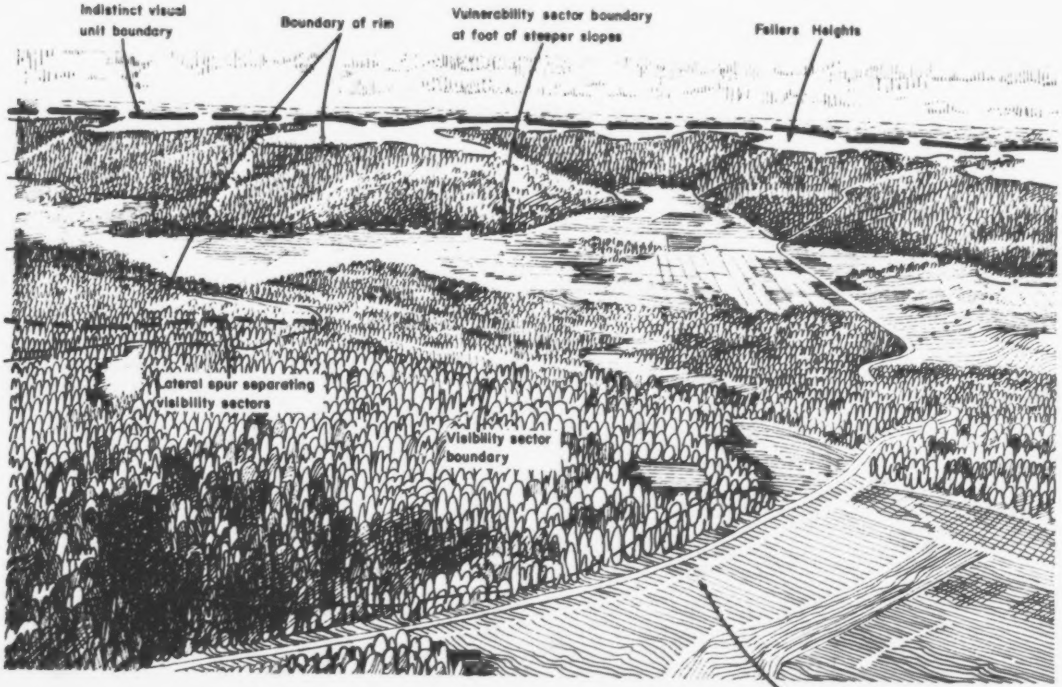
Indistinct visual unit boundary
Boundary of rim
Vulnerability sector boundary at foot of steeper slopes
Fellers Heights
Lateral spur separating visibility sectors
Visibility sector boundary
Brassey creek valley

FIGURE A.3 FELLER'S HEIGHTS: OBLIQUE VIEW SHOWING RIMS, VISIBILITY SECTORS AND VULNERABILITY SECTORS

A.1.2. VISIBILITY SECTORS

Visibility sectors may be identified in some units as a series of linked visual fields. They are distinguished by the presence of an internal threshold or minor impediment to viewing, which is cause for the subdivision of the unit into spatial sectors or sub-units, distinct but interconnected within the unit. A change in the direction of a valley, a break in the level of a valley floor, a side-valley opening to the main unit -- these are examples of such internal thresholds. The spurs separating adjacent side-valleys may be as distinct as the unit boundary, although both side-valleys contribute to the character of the unit. Examples of the visibility sector boundaries and lateral spurs are shown in Plate A.3. and Figure A.3.

If the visual unit is to remain a distinct entity, however, there must be limits to its complexity. For mapping purposes, it is important to discriminate between a valley as a visibility sector in a larger unit and a valley as a separate unit. A major symmetrical fork in a valley is usually best mapped as the convergence of three units, linked by portals. Large side-valleys which are visually cut off from a unit by an elevation difference or by narrow "pinching" of spurs, form separate units, while side-valleys largely visible from, and continuous with, the main valley form visibility sectors.

A.1.3. VULNERABILITY SECTORS

Vulnerability sectors define areas of differing visual vulnerability. Topography is the dominant criterion for mapping their boundaries. Where the unit comprises discrete areas with differing slope, marked by obvious slope-breaks, or with differing surface patterns, vulnerability sectors are mapped, as in Plate A.3. and Figure A.3. Vulnerability sectors are closely associated with terrain analysis units[1], and commonly discriminate between valley floors, valley sides, benches, and slopes above rims (rim sectors). The simplest units, such as plateaux and "U"- or "V"-shaped valleys, may have no marked division into vulnerability sectors. At the other extreme, rejuvenated valleys are quite complex, with marked benches above the valley floor or with a deeply eroded chasm. In this case, the lower concavity in the unit may be termed the primary enclosure, and the upper concavity, the secondary enclosure (Figure A.4.).

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[1] As mapped in the Terrain Classification System, E.L.U.C. Secretariat, 1976.

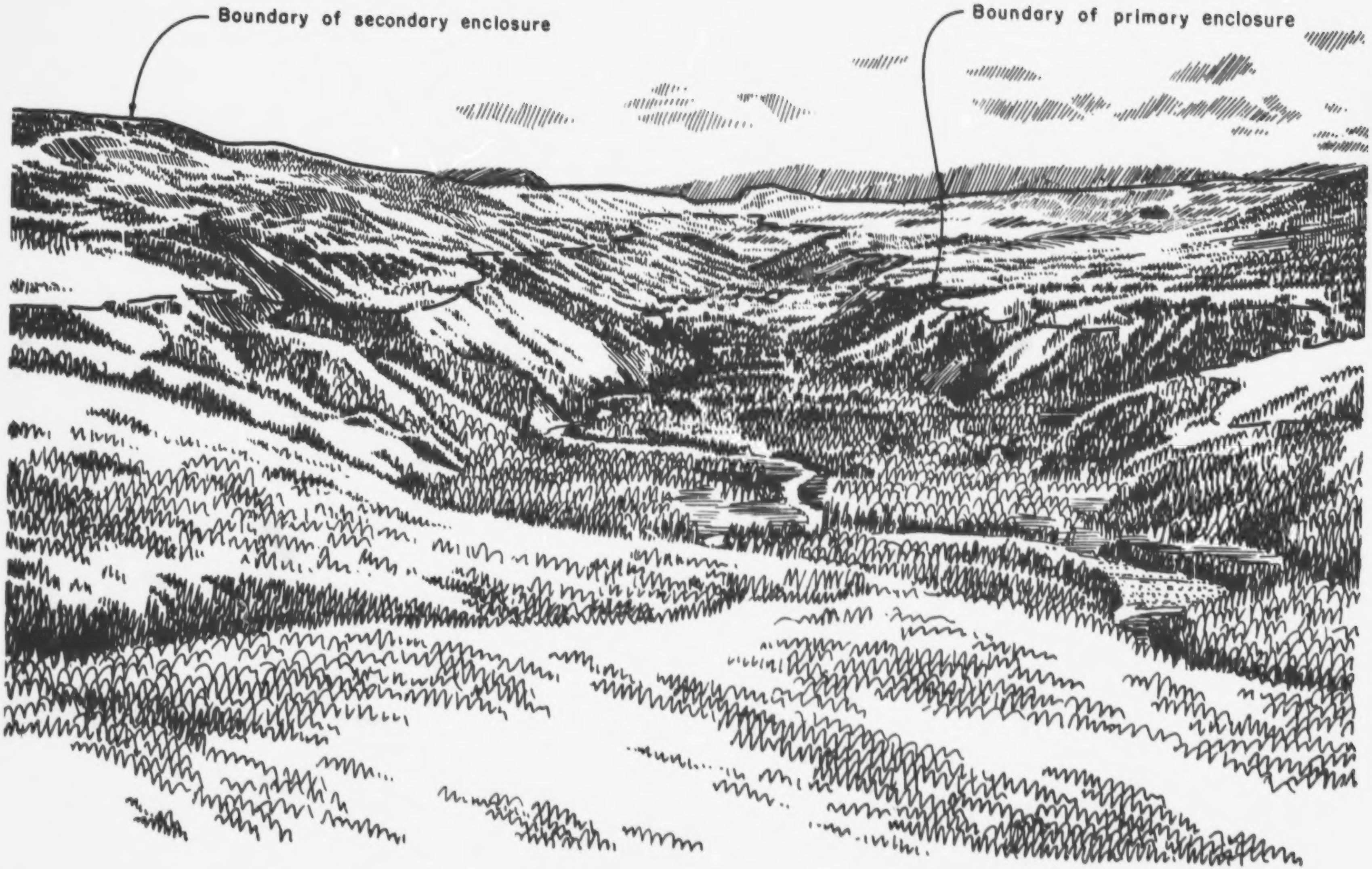

Boundary of secondary enclosure
Boundary of primary enclosure

FIGURE A.4. GWILLIM CREEK: OBLIQUE VIEW SHOWING PRIMARY AND SECONDARY ENCLOSURE.

A.1.4. SCENIC ELEMENTS

Scenic elements or features of locally high contrast, such as waterfalls, rapids, rock outcrops, distinctive peaks, or glaciers, are recorded individually on the visual unit maps. Lakes are also indicated, in recognition of the visual importance of waterbodies.

An example of the complete mapping technique at a scale of 1:100 000 is given in Figure A.5.

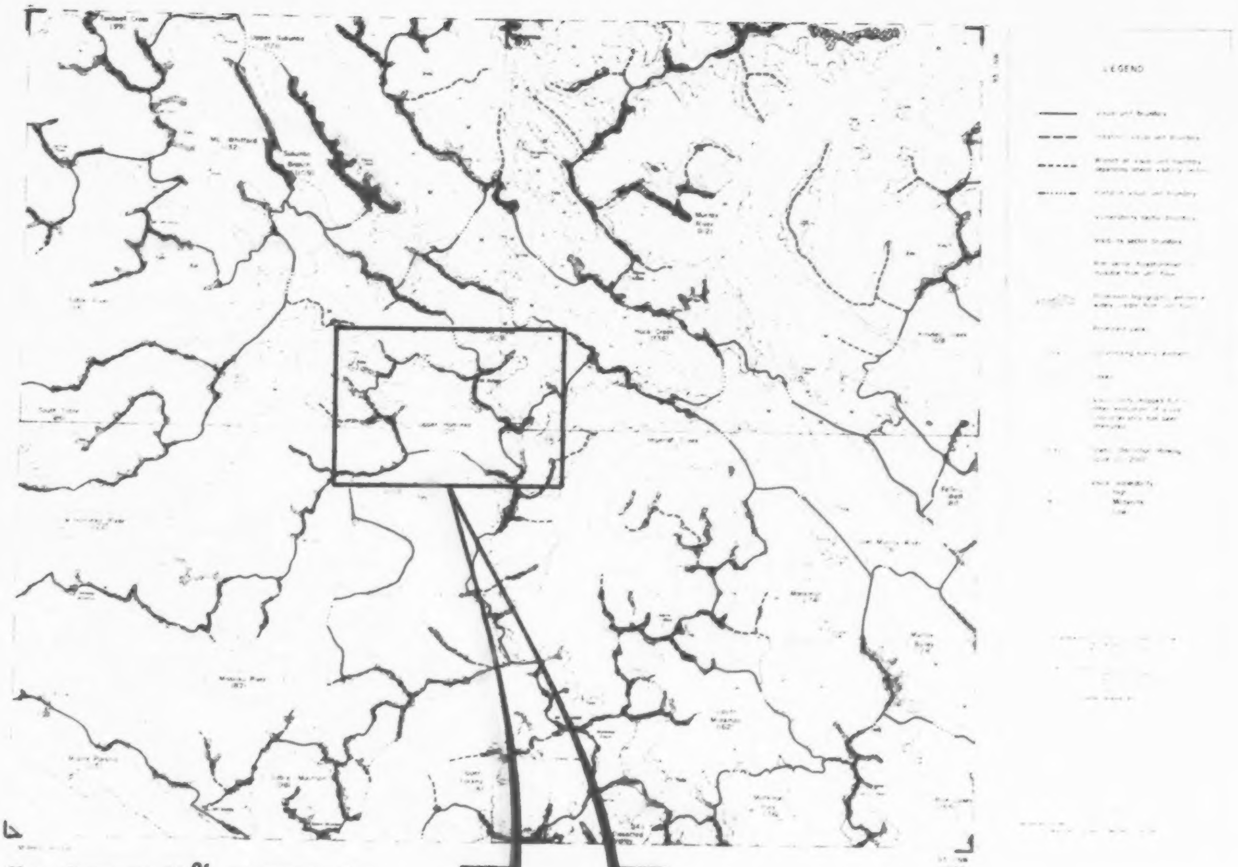
A.2. SCENIC DISTINCTION RANKING

In order to establish a frame of reference for evaluating the effects of development on scenic values, it is necessary to generate data in a systematic and orderly manner. The aim is to permit the comparative evaluation of the scenic qualities of visual units and regions, using a system which may be interpreted by non-specialists, and possibly applied to other study areas.

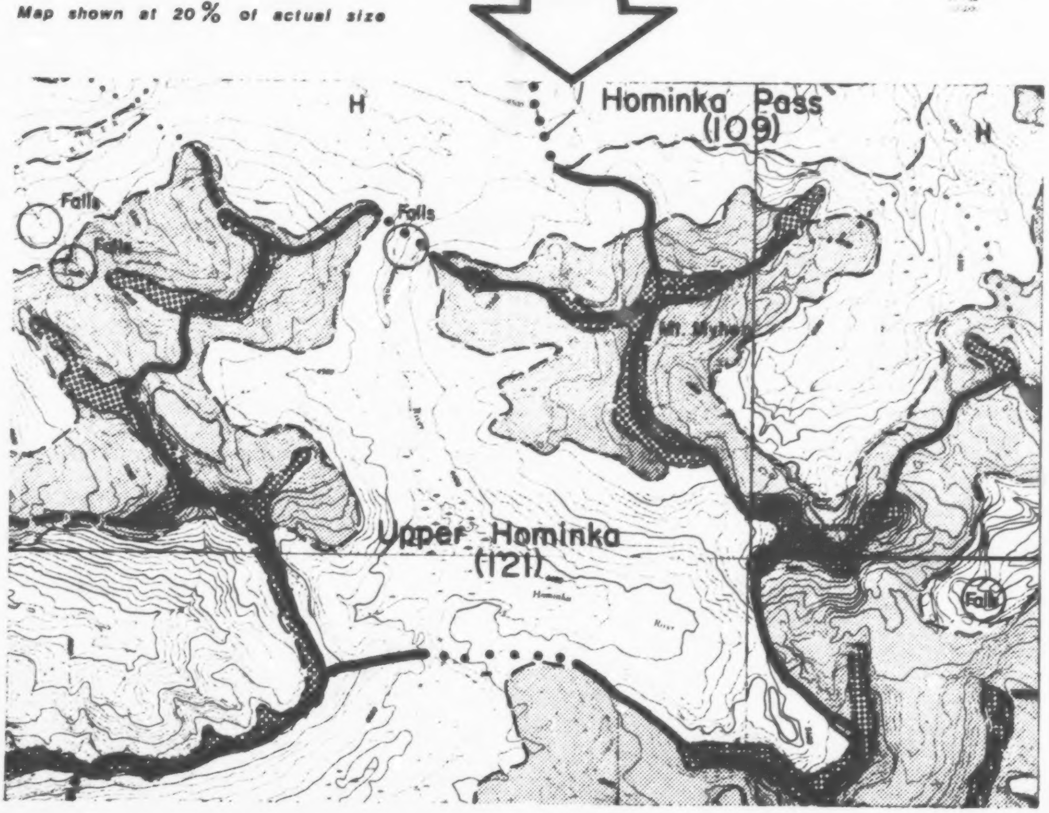
The system adopted is a rank order system. Each visual unit mapped is given a scenic distinction ranking, indicative of its scenic values. The system is based upon twenty scenic distinction factors, which are judged to be the most important in contributing to the scenic distinction of a visual unit as a spatial division of the landscape. Each of the scenic distinction factors carries a score of 0, 1, 2, 4, or 10, on a scale of low to high scenic quality. Each visual unit is assigned a score for every factor, and the twenty scores are totalled to give the unit an overall ranking score between 0 and 200. The following sections explain how and why this ranking system was developed.

A.2.1. THE REGIONAL CONTEXT FOR RANKING

The context for the scenic distinction ranking is taken as the range of landscapes found in the Interior of British Columbia, varying from the extensive forested lowlands of the plateau plains to the spectacular mountain scenery of the Rockies. The ranking system uses a selection of those landscape characteristics which are most closely representative of these physiographic regions. This permits comparative ranking of units in the Study Area with the landscapes of other mountain areas in Western Canada.



Map shown at 20% of actual size


H
Hominka Pass
(109)
H
Falls
Falls
Falls
Upper Hominka
(121)
Falls

Portion of map shown at full size: 1:100,000

FIGURE A.5. EXAMPLE OF VISUAL UNIT MAPPING

A.2.2. SCENIC DISTINCTION FACTORS

The scenic distinction factors (discussed individually below) describe the spatial dimensions and character of the unit, its water forms, its distinctive features and accents, its linkages with other units, and any degrading contrasts. It should be pointed out that the scenic distinction factors are assigned without reference to either existing access conditions or the potential for physical use in the landscape. Many of the features are generally accepted in the literature as contributing to scenic quality, and have precedents in the work of Leopold (1969), Linton (1968), Shafer, Hamilton, and Schmidt (1970), and the U.S. Forest Service (1973). The authors, however, take full responsibility for selecting and defining the factors used.

It would be difficult to develop a fully comprehensive array of scenic distinction factors. In this system, the number of factors is limited to twenty in order to keep the work involved within reasonable limits. The aim is to isolate those variables in the landscape which most affect the scenic distinction of visual units in the Study Area..

For simplicity, the ranking system attaches equal weight to the factors, since it is considered that a change in any one of them is sufficiently important in the landscape to alter the scenic character of the unit noticeably.

The system is, however, weighted in favour of both spatial character and, to a lesser extent, water forms, by the number of factors detailing these elements. This takes into account the dominant contribution of topography and water to relative scenic quality in the Study Area. Vegetation has a lesser influence in determining scenic distinction in this region, given its spectacular topography. In some units where topography is subdued, variety in plant cover and colour may make a dominant contribution to scenic value. It is recognized that vegetation may affect scenic quality considerably on a local or seasonal basis.

The concept of visual units as distinct and identifiable spatial subdivisions of the total landscape incorporates the notion of landscape "places" (Lynch, 1971), which are often sufficiently memorable to have acquired place names indicative of their spatial and physical form. This requires that the factors used to measure scenic distinction should include definition of the dimensions of space-enclosing elements. Since the system attempts to evaluate defined scenic landscapes in terms of the whole regional landscape fabric, rather than cataloguing scenic views and elements in isolation, certain of the scenic distinction factors stress the overlapping influences of adjacent units. The visual unit is the major subdivision to be evaluated in detail, but each unit depends strongly upon its position and relationship with other units.

The following text summarizes the importance of each of the twenty scenic distinction factors. The generalized drawings in Figure A.6 attempt to convey the essence of those factors which lend themselves to graphic portrayal.

SPATIAL DIMENSION AND CHARACTER

(1) Spatial Vividness: This is a generalized expression for the clarity and distinctiveness of the three-dimensional landscape which forms both the framework for the specific visual experience and the physical setting for scenic elements. The clarity and power with which the landscape forms such settings is greatest when enclosing elements are simple, vivid, and extensive; weakest when complex, weakly defined, or indistinct. Strong, high-walled valley forms and undulating or flattish complex landscapes without major definition form the extremes of the ranking for this factor.

(2) Cross-section Complexity: This is a measure of the relative distinctiveness of enclosing topography, giving greater advantage to continuous steep slopes which can be seen clearly from both near and distant positions, than to broken topography which appears to alter shape and enclosure with changes of position. In weaker landscapes, foreshortening obscures enclosing elements.

(3) Cross-section Proportion Index: Leopold (1969) makes the point that visual contrast between mountains and valley floors is an important measure of scale or grandeur. The sense of scale and enclosure increases as the observer approaches enclosing walls more closely, up to the point where that enclosure may become foreshortened or invisible due to projecting ledges or broken slopes. Where the valley floor is extensive, considerable distance may exist between the observer and enclosing elements, diminishing the vividness of the latter.

The Cross-section Proportion Index is an expression of these variables. It compares primary enclosure and the width of valley floors, using the primary enclosure height as the numerical base. To this is added one-half the width of the valley floor, on the grounds that observers view enclosure from a variety of viewpoints and positions, the average being near to one-half of the valley width. This addition favours large or broad valley systems which permit relatively open viewing of the enclosure at distances such that scenic details are clear and vivid. There is relatively little increment to narrow valleys where foreshortening reduces the scenic detail visible on the enclosing walls. However, this additional increment is limited to a figure no greater than one-half the enclosure height, on the grounds that a one-to-one ratio of enclosure height to valley width is a reasonable scenic norm.

Measure of this Index is made at that point in the unit where the contrast of primary enclosure and valley floor will yield the largest Index value. Expressing the Index as a formula, using metres as the unit of measure, it appears as follows:

$$\text{Cross-section Proportion Index} = \text{Primary Enclosure Height} + \left(\frac{\text{floor width}}{2} \leq \frac{\text{enclosure height}}{2}\right)$$

(4) Cross-section Contrast: This factor describes the nature of the contrast between the enclosing walls and floor. The floor is the visual arena which permits free movement and multiple views, and the walls form the strength of spatial enclosure. Greater value is placed on vivid and vertical enclosures rising from level floors, and less on those landscapes where floor and enclosure flow imperceptibly together, where the enclosing slopes are subdued or indistinct, or where a tilted, dished, or sloping floor reduces the vividness of the contrasting enclosing and floor forms.

(5) Linearity/Continuity: Advantage is given to a unit which extends in a distinctly linear manner to it distant enclosure. For such a unit, the distant as well as the local enclosure contributes to vividness, and from a variety of observer viewpoints, its form is more distinct. Observer orientation is thereby improved. Extended views, strongly framed, are characteristic of long linear valley forms, and views of distant peaks or landmarks (which may be shared by other units) make regional orientation more vivid. By contrast, less vivid units tend to be curved to preclude views of their extent from a single viewpoint, or are complex in plan with branches or embayments which disrupt the sense of continuity.

(6) Skyline: The skyline is one of the most vivid aspects of enclosure. Enclosing topographic forms and vegetation may be seen with great clarity and vividness against a bright sky. The presence of barren rock or snow intensifies contrast, and a sharp edge along the ridge-top may form a prominent skyline from many observer viewpoints.

(7) Profile: This is the perceptible form of the floor along the line of its long axis. It is possible for a strongly enclosed unit to have a broken, diffused, or obscure profile which contributes little to scenic values. When the profile of a valley floor exhibits clarity of form and a sense of continuity which invites scenic exploration, the vividness of the experience is enhanced. In most valley systems, the erosive action of water sculptures the topography of the profile and contributes to scenic distinction in varying degrees by visually linking a sequence of scenic elements or details.

(8) Floor: The unit floor provides the stage for the majority of scenic views, in contrast to the rarer, less accessible viewpoints gained by ascending to peaks or ridges. Rock, tree, and water elements together with the form of the floor, provide framing of views. This may enhance the quality of vistas by heightening the contrast between sharply-seen nearby elements and distant topography which is softened by atmospheric effects. Greatest value is given to open floors surrounded by vivid scenic enclosure; least to broken or heavily forested floors which provide little sense of foreground space or form, and which preclude significant distant views from the ground. Floors with open clearings and attractive tree cover may enhance viewing possibilities in modestly enclosed units.

WATER FORMS

(9-10) Extent and Character: Lakes and watercourses add colour contrast, motion and ephemeral reflections to a landscape, and their effectivenss in enhancing scenic values depends upon their visible extent and clarity. Water forms may help to unify a valley landscape or form a central element within it. Lakes and watercourses are evaluated separately since they often occur independently.

(11-12) Shoreline Form: The shoreline patterns of lakes and watercourses provide visual interest in the creation of edges of varying contrast, and draw the attention of the eye.

(13-14) Water Setting and Setting Frequency: The setting of waterbodies refers to their relationship to the spatial unit. Scenic distinction is greater where the topographic enclosure and waterbody interact vividly. A number of different setting types may increase the visual variety to be found within a unit.

DISTINCTIVE FEATURES AND ACCENTS

For individual features which may be described as visually arresting, the greatest value is given to those which contribute to the visible unity of the visual unit, rather than to the more dramatic appearance of the element seen in isolation.

(15) Falls and Rapids are examples of individual scenic elements which form foci of visual interest, dependent for their impact on their height, volume, and grouping along a watercourse.

(16) Peaks, Topographic Elements, and Geomorphic Features such as rock outcrops may have varying importance, where present, as landmarks or scenic details.

(17) Snow and Ice which persist throughout the year add another facet of colour contrast and visual interest, culminating in the dominating and distinctive influence of glaciers in higher valleys.

(18) Vegetation Contrasts determine the pattern of colours and textures found over large parts of the unit. As with the preceding features, vegetation contrasts may be important in enhancing units which are generally less distinctive, although they are often most vivid in the more distinctive mountainous units.

OTHER QUALITY INDICATORS

(19) Unit Connections and Linkages: The unit concept values a continuity of landscape which transcends the scenic attraction of a single place. A unit gains from both its position relative to other nearby complementary units and its size and influence relative to the regional landscape. Higher values accrue to units which form scenic foci or key links in the continuity and flow of landscape, thus providing access to important concentrations of units. Isolated or "dead-end" units are valued at the lower end of the scale unless they are strongly connected to units of major scenic importance.

(20) Impacts and Degrading Contrasts: The concept of the visual unit centres on an unflawed continuity of parts. In degraded landscapes, certain elements are seen to be out of place. The evaluation proposed here addresses only the broadest concerns but favours mitigation of development by careful design and site planning. It devalues vivid and contrasting alterations or struc-

tures which degrade extensive landscapes by visual association. Certain natural calamities may degrade scenic quality, often for the short-term only.

Note

These twenty scenic distinction factors are not completely independent of each other. Specifically, "spatial vividness" is a holistic factor which, in part, reflects the spatial parameters assessed in other scenic distinction factors; this is a deliberate attempt to stress the overall importance of scale and topographic form in landscape character. Generally, however, factors which can and do occur independently, commonly occur together on the ground: e.g. units with vivid cross-section contrast often have vivid skylines.

A.2.3. SCENIC DISTINCTION SCORES

The spread of scores through 0, 1, 2, 4, and 10 for each scenic distinction factor takes into account the disproportional contribution of high quality landscape elements to the scenic distinction of a unit. It permits adequate separation of total ranking scores, and avoids submerging the high scores of a few factors in the mass of more ordinary values.

Figure A.6 contains captions or definitions which, combined with the drawings, describe how scores may be assigned for each scenic distinction factor. Using these aids, it should be possible to minimize personal bias in assigning scores. The Glossary in Appendix B of Tetlow and Sheppard (1977) defines the terms which are used in Figure A.6.

It is recognized that many factors show a continuous gradation from high visual quality to low, and that, consequently, many of the factors are subdivided arbitrarily. The scoring system shown in Figure A.6. places reliance on simplicity and equal intervals between subdivisions. Where a factor varies in visual quality within a single unit, the score assigned is that of the highest quality occurring in a significant portion of the unit and contributing to the overall character of the unit.

The subdivisions of each factor shown in Figure A.6. are simply a guide to score selection, and should not be taken as all-embracing; users should make such special interpretations as may fit their particular situation.

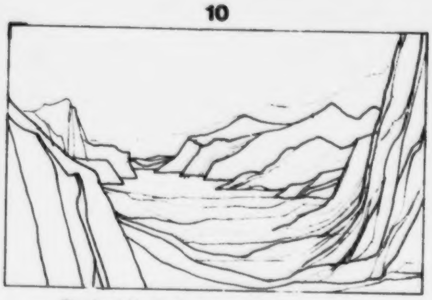
Figure A.6 Factors Used in Scenic Distinction Ranking

Spatial Dimension And Character

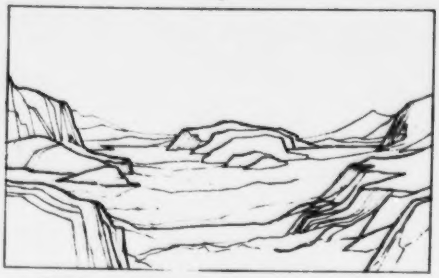
10

4

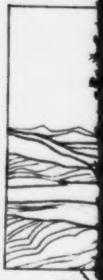
Spatial Vividness



Simple, vivid valley form; extensive or monumental.

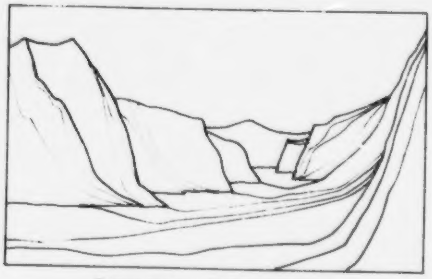


Complex, conspicuous valley form; many minor branches; extensive.

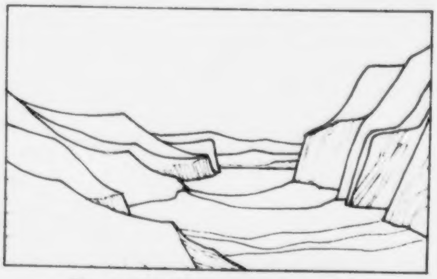


Distin

Cross-Section Complexity



Primary section unified; no secondary.



Primary and secondary are unified and distinct.

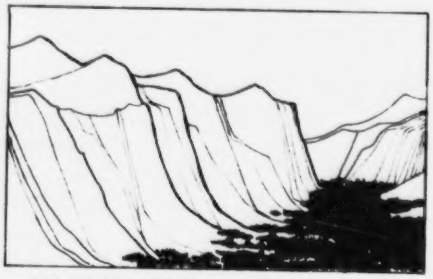
Prim
(or)

Cross-Section Proportion Index

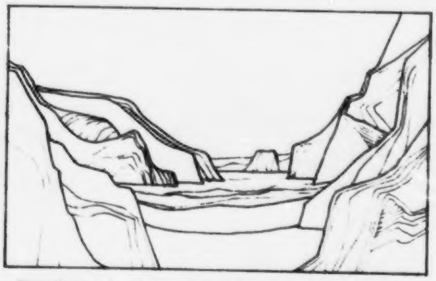
More than 1000 metres (3280 feet).

400–1000 metres (1312–3280 feet).

Cross-Section Contrast



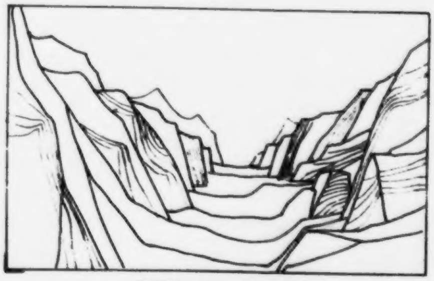
Vivid, unbroken high vertical or steep enclosure; contrasting floor plane, often extensive.



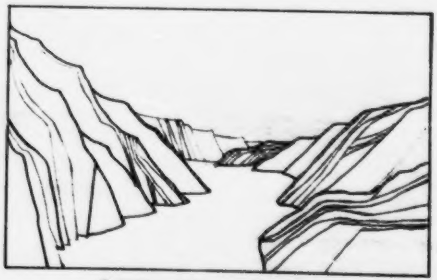
Conspicuous steep but broken enclosure slopes; level, dished, or filled floor.

Distinct enclo

Linearity and Continuity



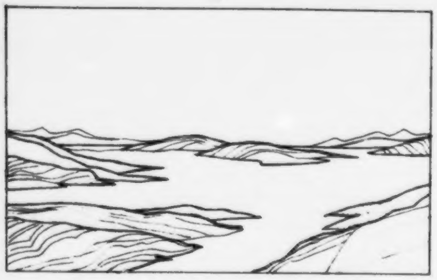
Vivid linearity; mostly straight



Conspicuously linear; mostly curved.

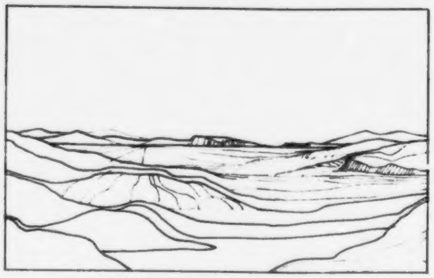
Distinctly

2



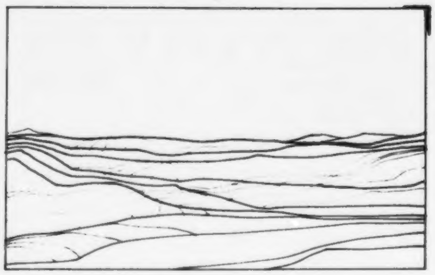
Distinct branched valley; portions simple and vivid.

1

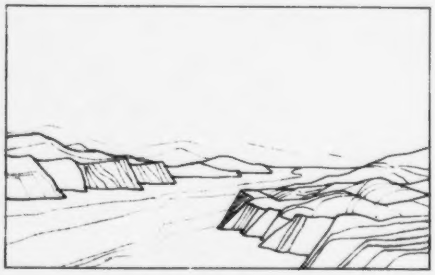


Definite valley form; large defined basin.

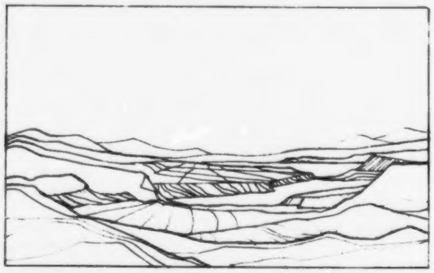
0



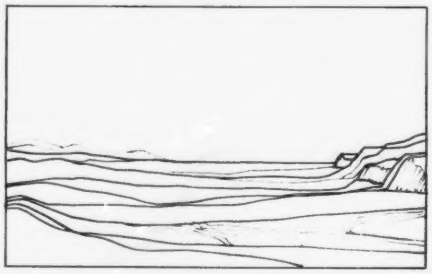
Topographic depression, weak definition.



Primary unified; secondary complex or indistinct.
(or) Asymmetrical: one side unified and distinct.



Primary and secondary benched, ridged, or irregular.

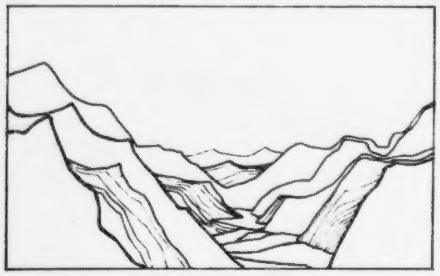


Frequently irregular or indistinct. Asymmetrical section or plateau.

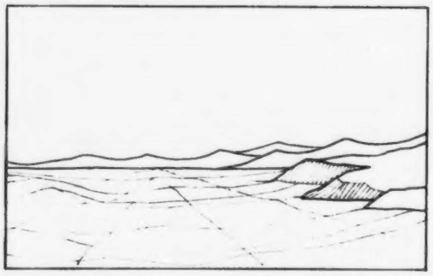
200–400 metres (655–1312 feet).

100–200 metres (328–655 feet).

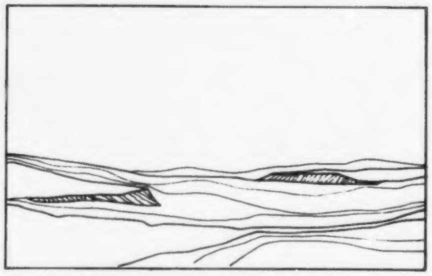
Less than 100 metres (328 feet).



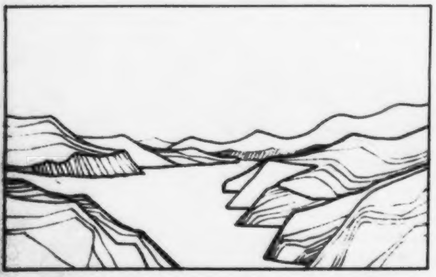
Distinct enclosure; narrow, dished, broken, or streambed floor.



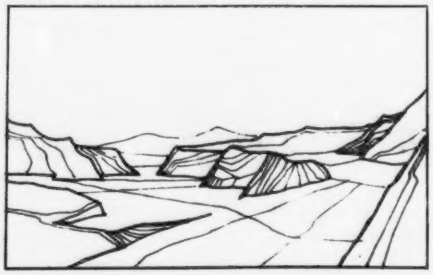
Steep but low enclosure contrasts with level or extensive floor.



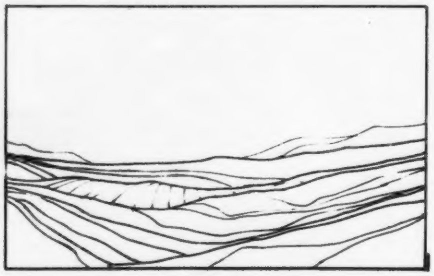
Broad dished or irregular floor; may have some accents in contrasty enclosure.



Distinctly linear with minor secondary branches or sectors.



Not strongly linear. Branched or complex; elevated narrow plateau.



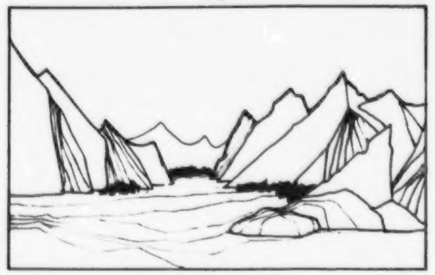
Expansive.

Figure A.6 (Continued)

Spatial Dimension And Character (Continued)

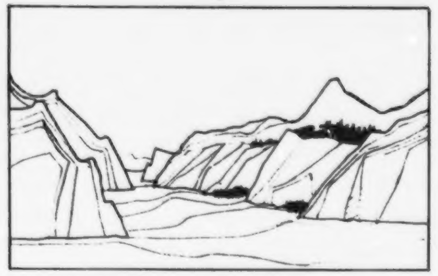
Skyline

10



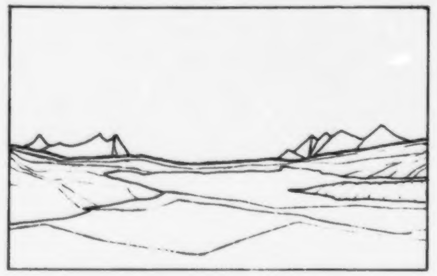
Sharp and vivid all around.

4



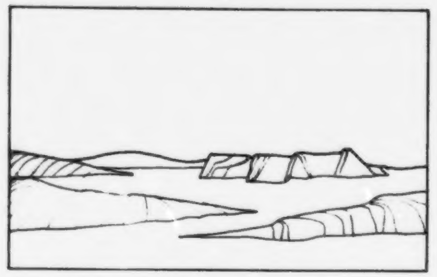
Mostly sharp and conspicuous; distinct all around.

2



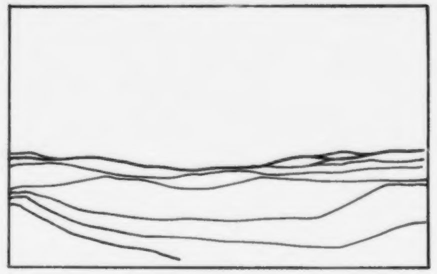
Sharp and vivid accents; mostly distinct or regular.

1



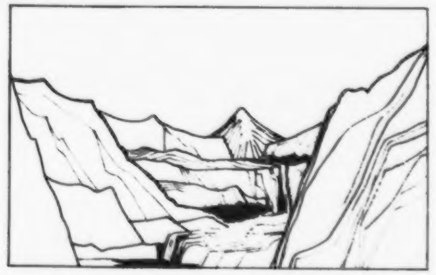
Distinct or definite in parts.

0

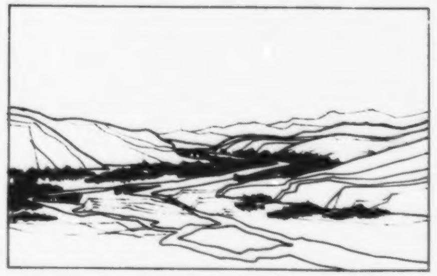


Low, discontinuous, overlapping, or indistinct.

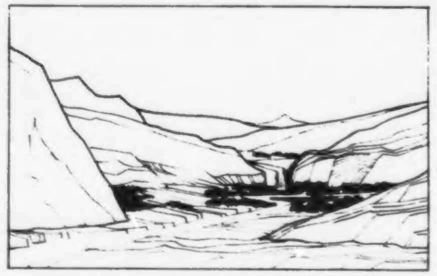
Profile



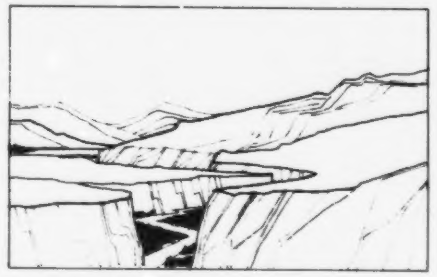
Vivid profile unifies and links terrain, water, and scenic features.



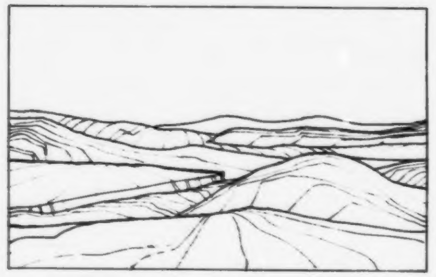
Conspicuous and extensive lake or stream-related profile.



Distinct profile; portions segmented or water-oriented; minor branches.

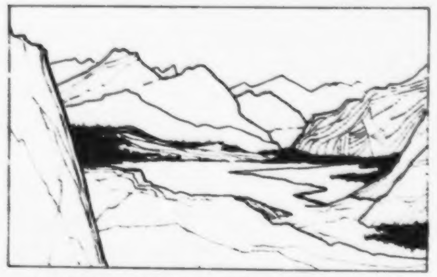


Complex profile, frequent changes in gradient, direction, or transverse tilt; often extensively branched.

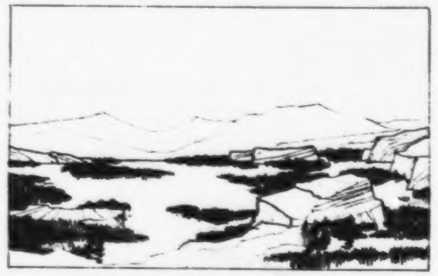


Discontinuous or inconspicuous; expansive, level, or undulating.

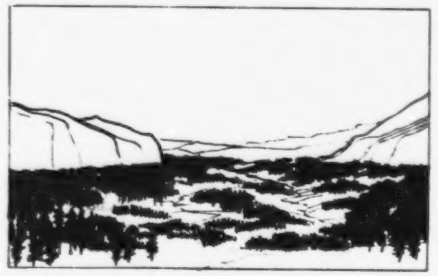
Floor



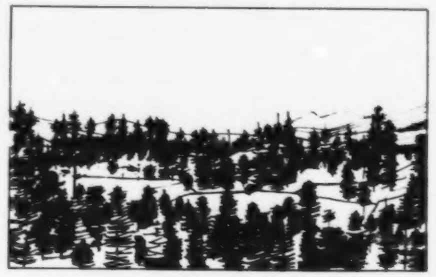
Vivid expanse of open terrain or water in midst of peaks and scenic features, with extensive panoramic views.



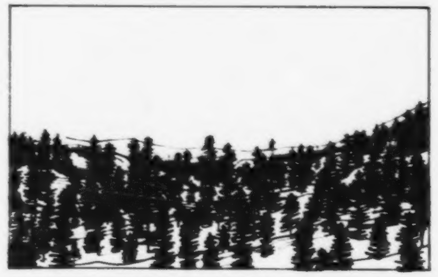
Conspicuous extent of contrasting enclosed and open terrain, framing distant views.
(or) Extensive water forms permit long or panoramic views.



Distinct openings or occasional water forms on forested or broken floor; distant views of higher enclosure only.
(or) Conspicuous extent of open but subdued terrain with no distant views; vegetation frames vistas.



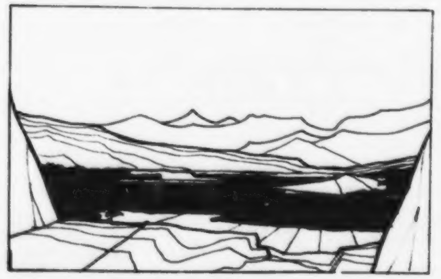
Floor mostly forested, and restricted or broken; occasional glimpses of distant elements or elevations.



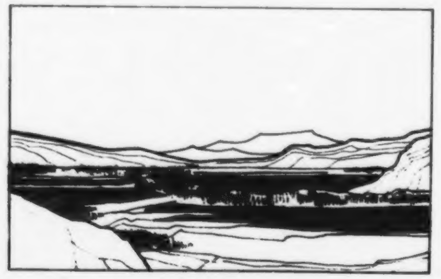
Heavily forested or closely confined floor, with foreground views only; no open areas or distant views.

Water Forms

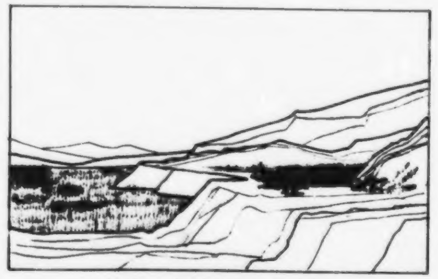
Lakes: Extent and Character



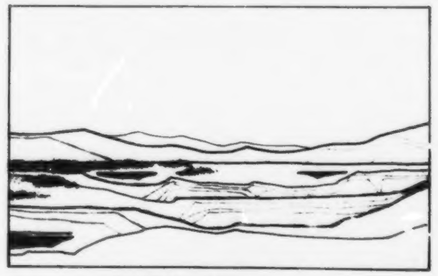
Major lake(s).



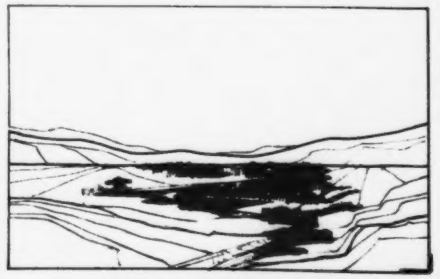
Numerous related or grouped lakes.
(or) Significant central lake(s).



Significant isolated or remote lake(s).



Scattered small lakes.
(or) Extensive marsh or weedy lakes.



Intermittent or seasonal water; no lakes.

Figure A.6 (Continued)

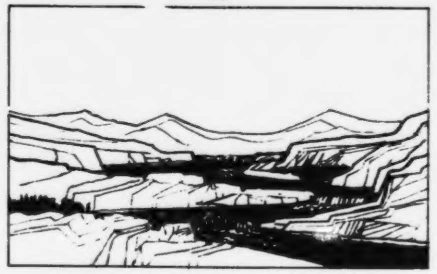
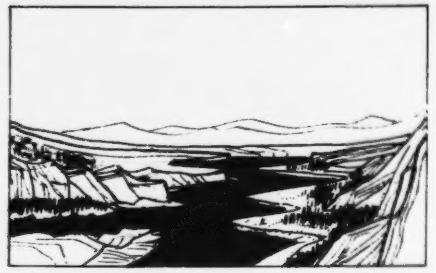
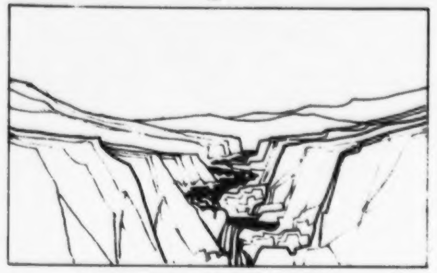
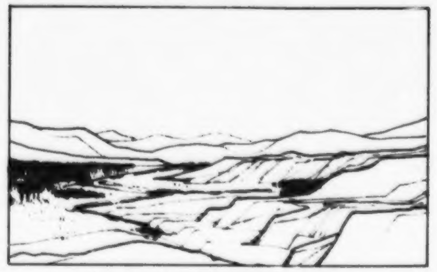
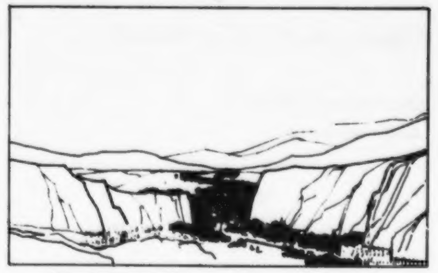
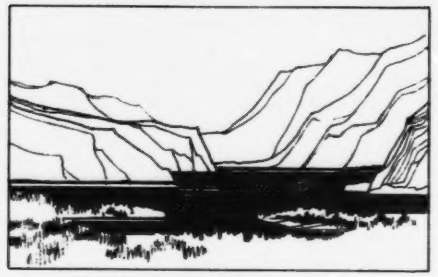
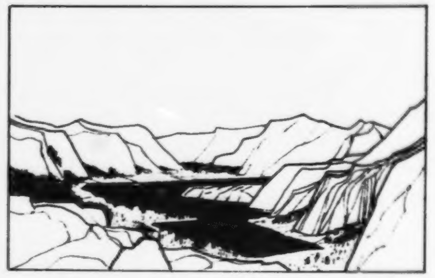
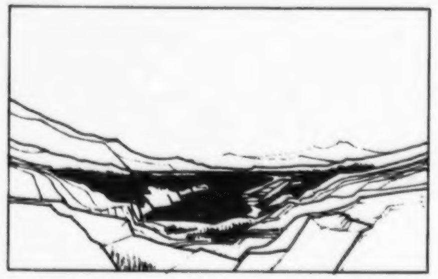
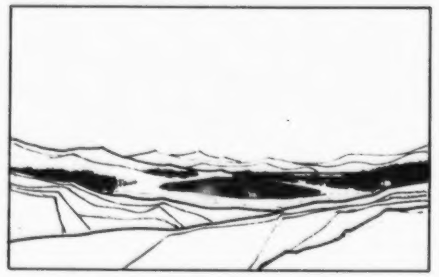
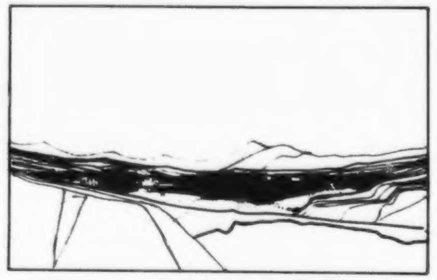
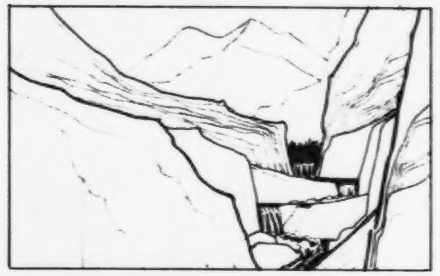
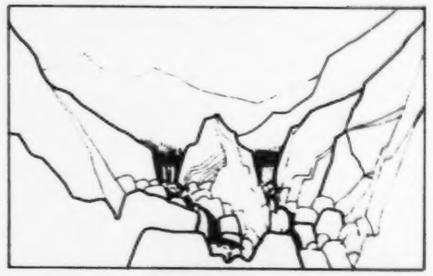
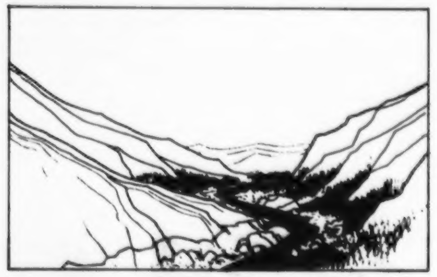
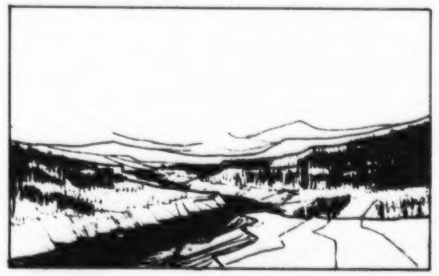
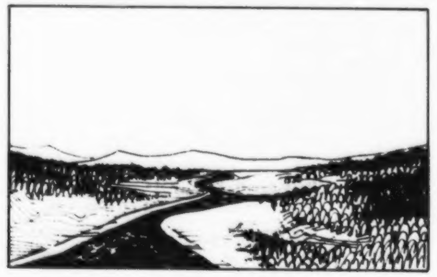
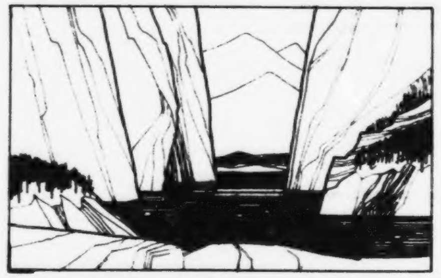
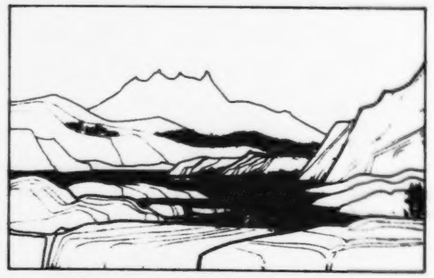
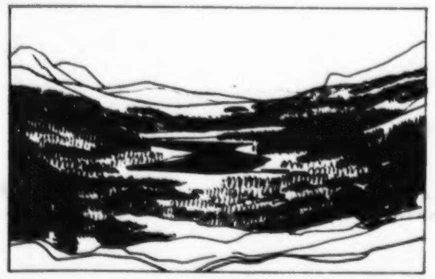
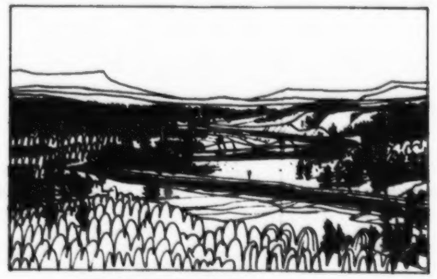
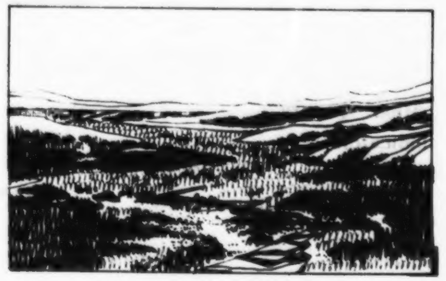
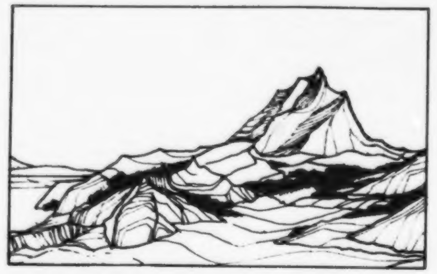
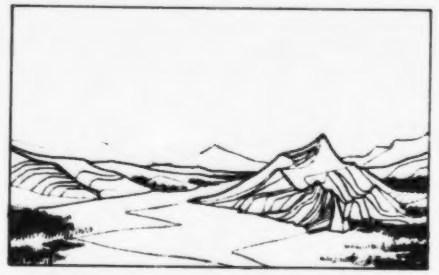
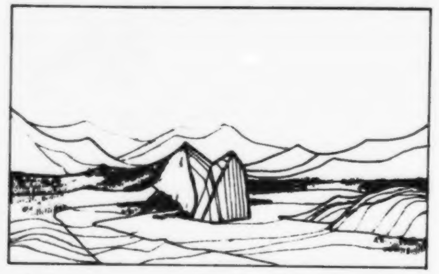
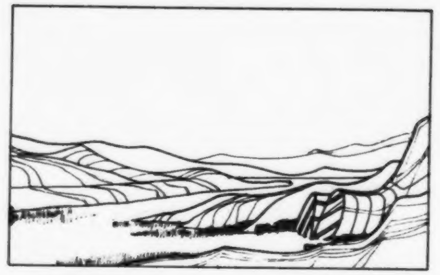
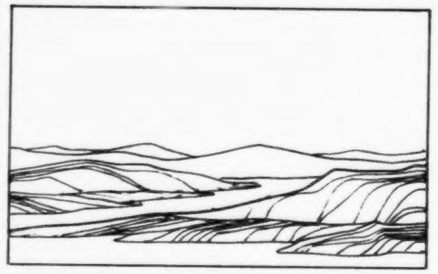
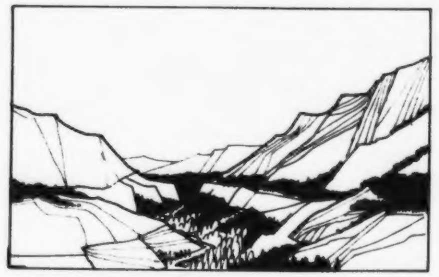
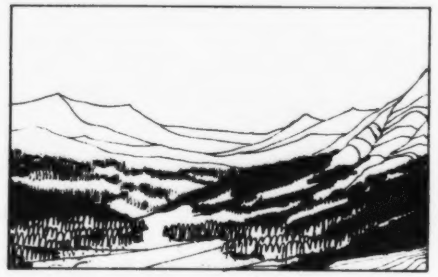
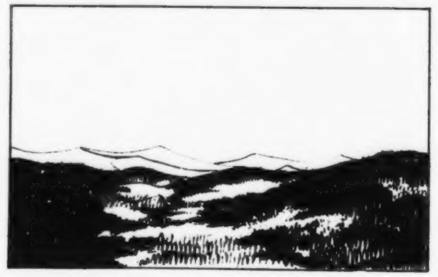
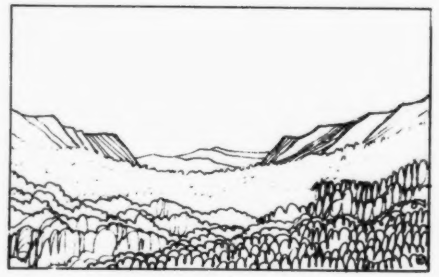
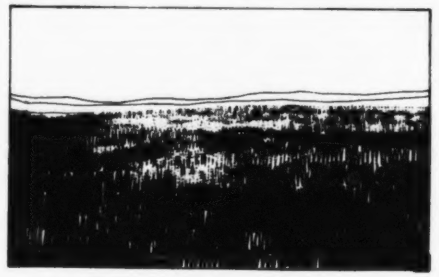
Water Forms (Continued)	10	4	2	1	0
Rivers and Streams: Extent and Character	 Extensive high volume stream; vivid visual flow and motion.	 Extensive high volume placid stream; minor active stretches.	 Visually active low volume narrow stream.	 Low volume open stream, placid or marshy.	 Minor stream; inconspicuous or concealed; seasonal or intermittent.
Lakes: Shoreline Form	 Highly indented lakeshores. (or) Many closely clustered lakes.	 Mostly irregular, some indented shores, bays, or elevated shores; some clustered.	 Mostly regular; minor indentations, bays or elevated shores.	 Simple and regular forms; clean or wooded shores.	 Simple and regular with low, uniform shore; often swampy or brushy. (or) No lakes.
Rivers and Streams: Shoreline Form	 Vivid channel in eroded bedrock; often sinuous.	 Mostly linear and deep channels in bedrock or other parent material; some high, broken, or rocky banks. (or) Extensively sinuous, meandering, or braided.	 Clean rocky or gravel bed; variation in bank height and course.	 Mostly uniform low mud and/or gravel banks or shore; often non-linear.	 Low shores, often linear.
Water Setting	 Vertical or steep primary enclosure forms vivid setting and containment.	 Ledges, faces, or strata form conspicuous lake basin or watercourse. (or) Alpine setting.	 Water prominent at low point in distinct valley or basin. (or) Distinct eroded canyon or gully encloses watercourse.	 Broad setting in varied terrain. (or) Subdued riparian setting in open landscape.	 Obscure or subdued, screened by trees.
Setting Frequency	Three or more distinct water setting types in unit.	Two or more distinct water setting types in unit.	Single distinct setting; more than one element in single setting type.	Single water element and setting type.	Single setting; water seasonal, intermittent or absent.

Figure A.6 (Continued)

	10	4	2	1	0
Distinctive Features And Accents					
Falls and Rapids	Series of significant falls on single stream. (or) Two or more seperate high falls. (or) Single high volume high fall.	Single low volume high fall in vivid setting. (or) Single high volume low fall. (or) Series of low falls on single stream.	High fall of low volume. (or) Series of rapids and occasional falls on single stream.	Low volume low falls. (or) Occasional rapids.	No significant falls or rapids.
Peaks, Topographic Elements, Geomorphic Features	 Vivid summit forms orienting landmark(s) in this and adjoining units.	 Conspicuous peak, topographic element, or geomorphic feature dominates unit. (or) Two or more peaks, topographic elements, or geomorphic features share dominance.	 Topographic/geomorphic element forms distinct feature within unit.	 Topographic/geomorphic elements form feature(s) in parts of unit.	 Topographic/geomorphic elements form no definite features.
Snow and Ice	Glaciers in unit.	Persistent and extensive snow and ice fields.	Scattered persistent snow patches.	Isolated snow patches in sheltered areas, not widely visible.	No persistent ice or snow.
Vegetation Contrasts	 Vivid plant contrasts and patterns emphasize terrain or environmental characteristics; extensive natural openings and edges of high contrast.	 Conspicuous contrasts and patterns; natural or agricultural openings and edges, some diffuse.	 Scattered contrasts, no conspicuous pattern; openings or edges diffuse. (or) Extensive established agricultural landscape.	 Minor plant contrasts and openings. (or) Continuous deciduous cover. (or) Scattered forest clearings. (or) Immature reforested areas.	 Continuous coniferous cover. (or) Thinly distributed poor cover.
Other Quality Indicators					
Visual Unit Linkages	Unit is major scenic climax to several adjacent units.	Unit forms a link in chain of major scenic units. (or) Hanging valley with fall or other conspicuous connection.	Corridor links units; may have minor branches. (or) Deadend or weak corridor with access via major unit.	Deadend corridor connects to minor or extensive unit.	Complex, wide or extensive unit; weak corridor.
Impacts and Degrading Contrasts	Wilderness or unimpaired landscape. (or) Development compatible with, or enhancing, landscape character.	Minor degrading natural events. (or) Short-term minor visual impacts.	Permanent impacts in limited areas. (or) Impacts reflect historic events. (or) Limited agriculture fits land form and character.	Scattered conspicuous scars and impacts; extensive contrasting agricultural forms and impacts.	Vivid and permanent impacts to scenic quality; extensive degrading natural events of long-term visual consequence.

The final ranking score for each unit is transferred to the 1:100 000 Visual Unit Maps, below the name which identifies each unit.

A.3. VISUAL VULNERABILITY ASSESSMENT

Some visual units can absorb major developments in portions of their area without altering their landscape character; others may be more conspicuously degraded by relatively minor developments. In most cases, the higher the visual vulnerability, the greater is the difficulty of mitigating visual impacts. What is most important in visual vulnerability assessment is the potential for change in the contrast between the development site and its surroundings, not the potential for change in the appearance of the site itself. Figure A.7. attempts to show these relationships diagrammatically.

Contributing to the significance of such visual relationships are those biophysical factors which determine the duration of disturbance within the landscape and the further visual consequences which may originate from it. Also of importance is the extent to which these disturbances are apparent; visual vulnerability varies with potential exposure to viewing, a characteristic inherent in the elevation and aspect of possible impact sites in the landscape (Litton, 1974).

The vulnerability assessment procedure is not as detailed or exhaustive as is the procedure for ranking scenic distinction (Section A.2.). Important vulnerability data on soil erodibility, soil colour, revegetation potential, and climatic severity are not incorporated in the procedure at present. Nevertheless, there remain some factors which have high signficance in themselves as indicators of vulnerability, and which lend themselves to a simple assessment based on the possibility of mapping vulnerability sectors. These factors are:

i) Slope

The steeper the slope, the greater is the viewing angle from most observer positions in the visual unit, and the more readily visible the slope becomes. Compared with developments on valley floors and benches, developments on steep slopes are less likely to be screened by trees, either on the slope or near the observer. Moderate slopes may introduce more screening and foreshortening in the views of impacts, while variations in gentle slopes screen and foreshorten views considerably. It may be assumed that, in most instances, observers view the unit from its lower flatter areas, although acccessible and prominent ridge-lines, peaks, and rims provide viewpoints of special significance. Regardless of observer positions, however, the vulnerability of steeper slopes is inherently

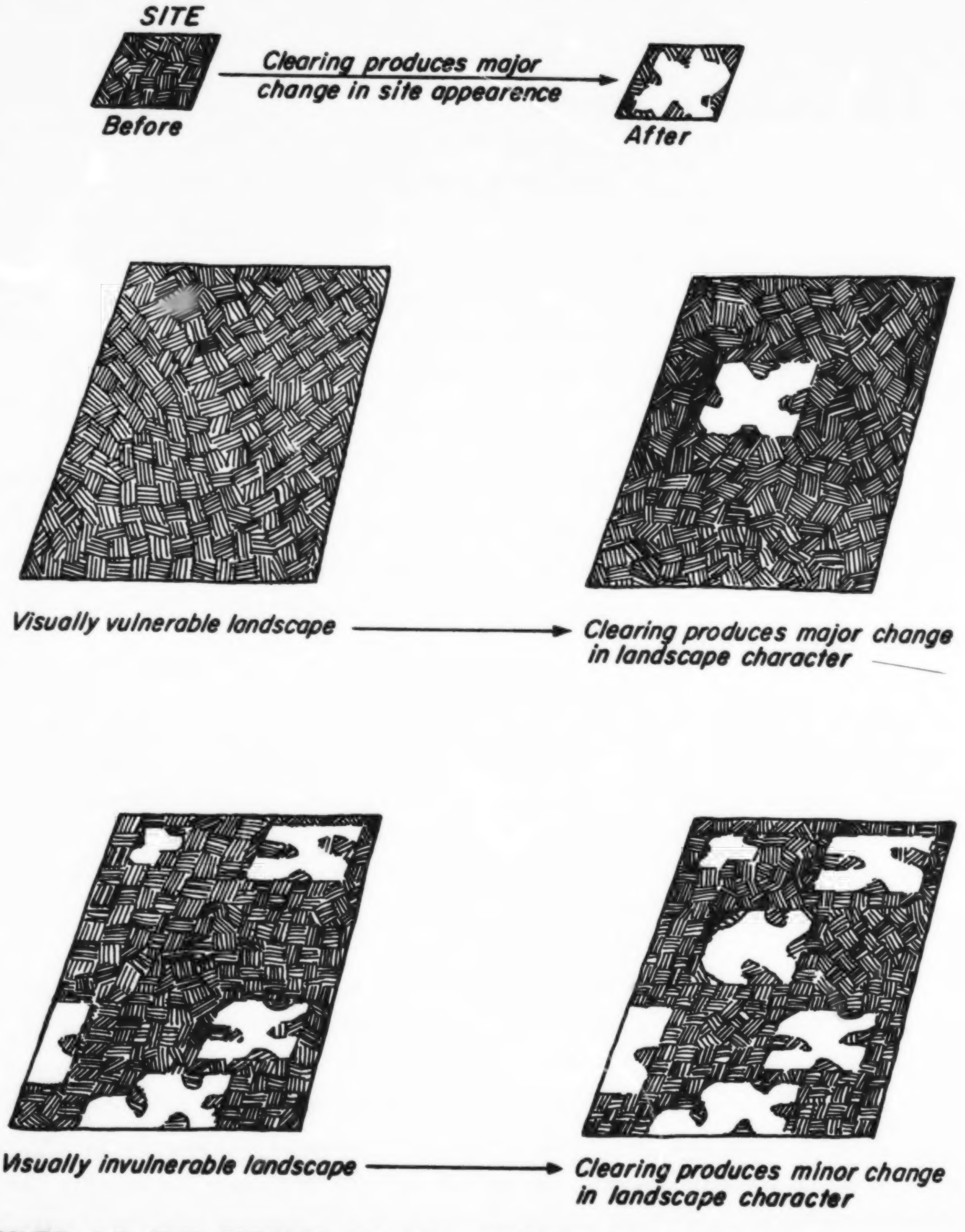

SITE
Clearing produces major change in site appearence
Before
After
Visually vulnerable landscape
Clearing produces major change in landscape character
Visually invulnerable landscape
Clearing produces minor change in landscape character

FIGURE A.7. THE EFFECTS OF SITE CHANGES ON LANDSCAPE CHARACTER

high, due to the need for landform alteration in building horizontal structures or achieving easy gradients.

For assessment purposes, slopes may be divided approximately into: steep (30%+), moderate (15-30%), and gentle (0-15%).

ii) Surface Patterns

Surface patterns are created by a combination of:

(a) Surface Forms (i.e. the topographic expression of a landscape at a scale too small to be adequately revealed by contour information on 1:50 000 topographic maps; E.L.U.C. Secretariat, 1976).

(b) Colour and Texture Contrasts associated with vegetative cover, bare ground, water, and ice.

For any given slope, surface pattern may be categorized as:

(a) Inconspicuous - patterns generally absent (uniform or indefinite pattern), or of low contrast (definite patterns).

(b) Conspicuous - extensive patterns of high contrast[1], either oriented across the landscape (vertically or horizontally), or irregular (without linear orientation).

Uniform and vertical surface patterns tend to be the most visually vulnerable, since development would be likely to introduce contrasts deviating in intensity or appearance from the pre-existing patterns. Horizontally-oriented landscapes are less vulnerable to transportation and utility developments which usually follow the contour. Irregular surface patterns, by virtue of their complexity of form and colour, tend to absorb or screen developments more than do uniform landscapes.

Figure A.8. indicates how the various surface patterns may be categorized, and combines them with slope classes into a matrix for assessing visual vulnerability to a conjectured linear impact (e.g. highway, rail route, power-line or pipeline). For interpretation of this matrix, which is based on only two major factors, it is considered unrealistic to identify more than three levels of visual vulnerability: high (H), moderate (M), and low (L). One of these symbols is assigned to each vulnerability sector. Figure A.8. should be used as a guide to assessment; some judgement is required in marginal or exceptional cases.

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[1] Where form is conspicuous but colour/texture is inconspicuous (or vice versa), the sector is classed as having conspicuous surface pattern.

The assessment deals primarily with vulnerability to any linear impact oriented generally along the contour, since routes form the prevailng type of development proposed for the corridors. However, the assessment also indicates vulnerability to point impacts and area impacts (Litton, Tetlow, Sorenson, and Beatty, 1974), since relatively few landscapes can absorb extensive linear impacts more easily than area impacts. Specific evaluations would be necessary for across-contour impacts, such as mine conveyors, cross-valley pipelines, and ski-runs. Where the landscape character has already been altered by man, as in forest clearings and rights-of-way, the pre-existing landscape character may still be estimated from remaining tracts. In such cases, both the original and present vulnerabilities are identified; e.g. a sector originally completely forested, but now containing openings, might be classed as H (M).

A.4. CRITICISMS OF THE METHODOLOGY

In summary, the methodology for visual analysis presented here involves three aspects of the visual resource -- scenic distinction, visual vulnerability, and visibility as a component of observer set -- and determines the first two in some depth. The basis for analysis is the concept of the visual unit as a spatial subdivision of the landscape. The mapping of these units is the first stage in the methodology. Each unit is then given a ranking score which indicates its relative scenic distinction within the region. Sectors identified within the unit are assessed on the basis of criteria of visual vulnerability. The results of these evaluations are presented on Visual Unit Maps at a scale of 1:100 000, and form the data base from which specific interpretations may be drawn.

The methodology for visual unit analysis relies on data sources such as topographic maps and aerial photographs, from which the visual character of the actual sites must be imputed. For this study, every effort was made to acquire and use ground-level and oblique photographs to augment planimetric data and vertical photographs. Nonetheless, in any scenic evaluation there is a need for supplemental verification materials which can only be obtained at or near ground level. In particular, there is a need for detailed information on the masking effects of topography, tree cover, and enclosing forms, seen from selected points in the units.

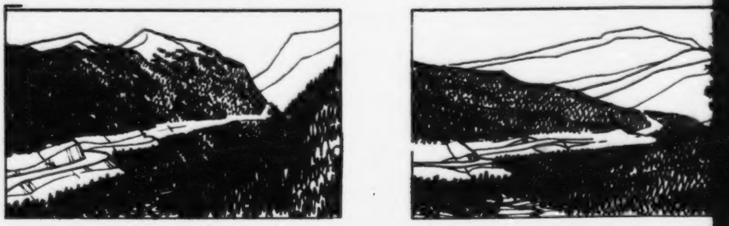
Figure A.8 Criteria For Visual Vulnerability Assessment

STEEP SLOPE (30 %+) | MODERATE SLOPE (15-30 %)

Inconspicuous Surface Pattern
Patterns generally absent or of low contrast

Indefinite pattern (uniform)

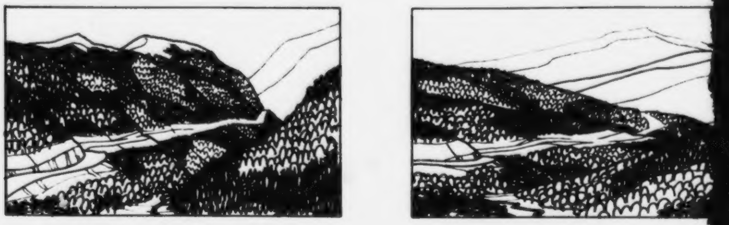
Form: subdued surface expression
Colour/Texture: extensive or continuous forest canopy with conifers only, deciduous trees only, or mixed and scattered conifers/deciduous; or extensive open ground



HIGH visual vulnerability | HIGH visual vulnerability

Definite pattern (low contrast)

Form: subdued or weak surface expression
Colour/Texture: extensive or continuous forest canopy with discrete irregular groups of conifers and deciduous trees.

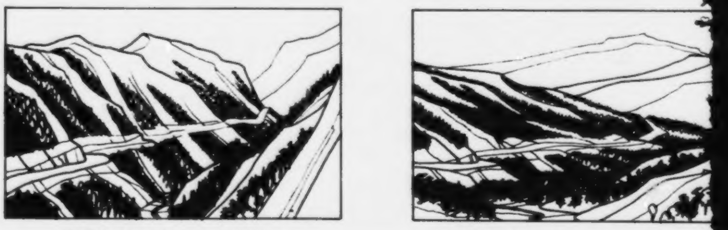


HIGH visual vulnerability | MODERATE visual vulnerabilit

Conspicuous Surface Pattern
Patterns of high contrast

Vertical pattern (oriented into vertical lineaments running across contours)

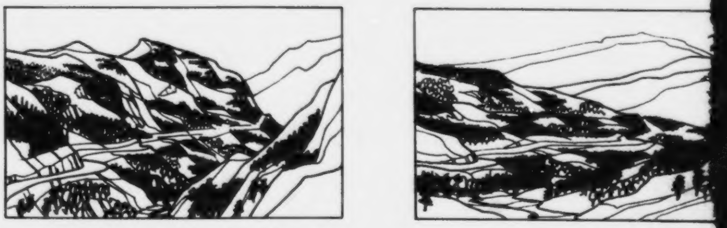
Form: gullied slopes, colluvial fans.
Colour/Texture: avalanche chutes, riparian vegetation strips.



HIGH visual vulnerability | MODERATE visual vulnerability

Irregular pattern (no markedly linear orientation)

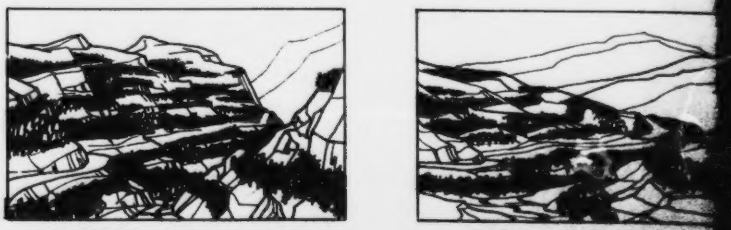
Form: hummocky terrain, scattered rock outcrops, and erosional slopes.
Colour/Texture: broken forest canopy with numerous or extensive marshy openings, meadows, burnt areas, or clearings.



MODERATE visual vulnerability | LOW visual vulnerability

Horizontal pattern (oriented along the contour)

Form: terraced or benched slopes, ridged valley floors, prominent horizontal rock exposures.
Colour/Texture: horizontal strata exposing bare rock or supporting bands of vegetation.

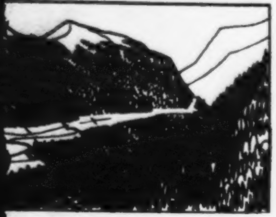


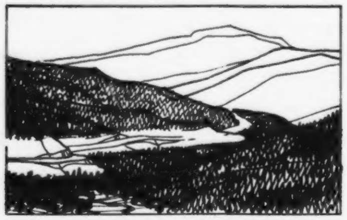
MODERATE visual vulnerability | LOW visual [illegible]

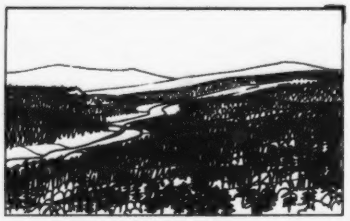
STEEP SLOPE (30 %+)

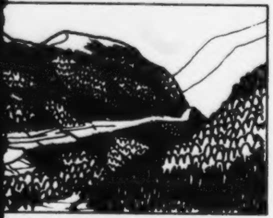
MODERATE SLOPE (15-30 %)

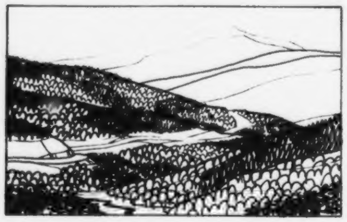
GENTLE SLOPE (0-15 %)

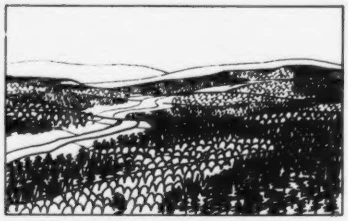

GH visual vulnerability

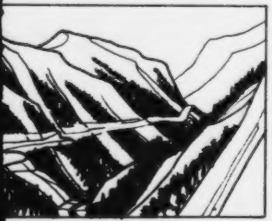

HIGH visual vulnerability

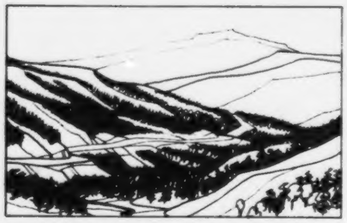

MODERATE visual vulnerability


GH visual vulnerability

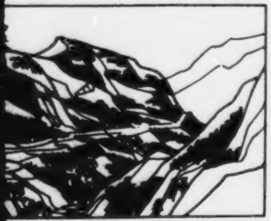

MODERATE visual vulnerability

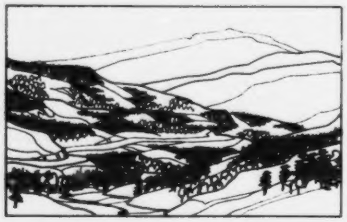

MODERATE visual vulnerability

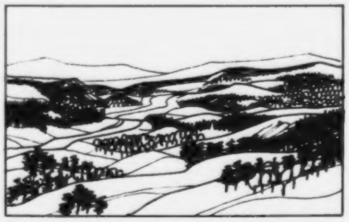

H visual vulnerability

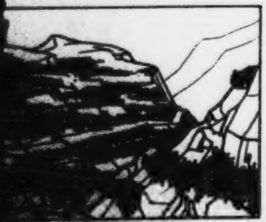

MODERATE visual vulnerability

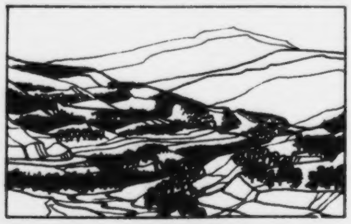
Not distinguishable

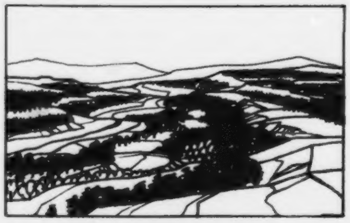

ATE visual vulnerability


LOW visual vulnerability


LOW visual vulnerability


visual vulnerability


LOW visual vulnerability


LOW visual vulnerability

The concept assumes that observers are not limited to specific viewpoints. However, certain developments (e.g. townsites, overlooks) may require identification of more precise views and viewpoints than can be drawn from the Visual Unit Maps. Such requirements would demand considerable field-plotting or the introduction of computer programs designed to produce visibility maps (Travis, Elsner, Iverson, and Johnson, 1975; Lemkow, 1977). Precise inventory from these selected viewpoints would permit the monitoring of changes in the landscape as development proceeds (Litton, 1973).

The mapping procedure works well in topography such as that covering most of the Northeast Coal Study Area, but is harder to apply in flatter terrain, as is found east and west of the Rockies. Mapping of unit boundaries becomes difficult and somewhat arbitrary where slopes are low and rolling, and visible area changes markedly with different observer locations. This is unlikely to affect the scenic distinction rankings for such landscapes, but may require additional definitions for mapping indistinct boundaries in studies of extensive lowlands.

It must be borne in mind that the flow and continuity of landscape is a vital consideration, despite the tendency of the mapping procedure to indicate functional subdivisions. The visual unit concept generates boundaries which are natural divisions seen by observers in the valleys, but which are less prominent as observers climb a ridge. Vigilance will be necessary in order to prevent the use of visual unit boundaries as rigid "fences", sheltering areas of differing administrative and management standards (McBride and Clawson, 1970).

With respect to scenic distinction ranking, an assumption which may be questioned is that scenic value can be represented by a single number, located on an ordinal (ranking) scale from zero to 200, and derived by summing the scores of twenty contributing factors. However, the summing of scores is the most direct method of taking into account all factors which are significant in forming a cumulative visual experience within a visual unit. The relative scores are assigned by qualitative evaluation, and, hence, it should be clear that no absolute quantitative relationship between the ranking scores of different visual units exists. The ranking system does not assert, for example, that a unit with a ranking of 100 is ten times as scenic as a unit with a score of 10. It aims instead to provide a relative scale on which regional scenic values may be ordered and compared, unit by unit.

As practical experience was gained in applying the factors shown in Figure A.6., some adjustments were made to improve the system in use, and to describe more accurately the range of physical characteristics which are encountered in the Study Area. In that limited sense, they are tested. Additional data would be required for evaluating landscapes under different climatic regimes or with different geomorphology (e.g. coastal or desert areas). However, for the mountain landscapes typical of Western Canada, the system appears empirically to generate a satisfactory spread in the rank order of units.

Given the present state of the art, it is uncertain how many factors are necessary in order to achieve a relatively comprehensive and satisfactory evaluation of scenic distinction. Additional factors might increase reliability but could increase time and cost. The twenty factors selected, however, should be verified for their effectiveness by applying them to other, comparable sites. Additionally, panels of judges familiar with the ground could be convened to review the rank order of units, noting anomalies and identifying possible omissions in procedure. It would be helpful to implement user preference surveys designed to investigate the relationships between scenic values, land use, recreation, and work. Such studies might be influential in modifying present factors or adding other preference factors (Greenbie, 1975).

Some specific criticisms of the ranking system should be noted. Adverse visual impacts are considered only in one out of twenty scenic distinction factors, whereas their effects on the landscape may, in the extreme, be dominant. Because of the relatively undeveloped state of the Study Area, no complex ranking of existing visual impacts was attempted. However, future studies may require more sophisticated assessment of visual impacts, with special emphasis on the problems of: (i) negative scores for human and natural disturbances; (ii) enhancement of scenic values by developments; and (iii) duration of visual impact.

The ranking factors preclude scenic evaluation at a detailed scale. More intensive inventory is required to analyse important but site-specific elements, such as flowering plants or tree groups. Seasonal constraints on the ranking system are also applied by the study procedure. The data used for ranking (photographs taken during summer fieldwork and aerial photographs) preclude direct evaluation of winter landscapes.

Visual vulnerability assessment, as represented here, addresses only two of the factors likely to be of influence in any proposed disturbance of natural conditions, a limitation imposed by both time and the availability of data. Ideally, technical information on soils, terrain, vegetation regeneration rates, and climate should be included so that more comprehensive visual connotations may be drawn from a coordinated biophysical analysis. A greater problem is posed by the indeterminate nature of development alternatives, many of which are conceived very simply as a route line, an area for a town, or a site for extracting materials. Even the simplest proposals contain many possible alternatives, with many possible visual impacts. Graphic design guidelines for such alternatives, if available, would increase the effectiveness of this type of assessment for vulnerable landscapes.

It is expected that extensions in the mapping and evaluation procedures may be necessary to meet the demands of new studies. It must be emphasized, however, that the visual unit concept remains useful regardless of the evaluation system chosen.

Notes on Appendix A

R. Horner has made certain changes to the terminology used by Tetlow and Sheppard (1977) in the above appendix. Most notably, for "scenic distinction", Horner has substituted "visual quality", for "scenic distinction ranking score", he has substituted "visual quality ranking score", and for "scenic distinction factors", he has substituted "visual quality indicators".

B INVENTORY METHODS

LANDSAT satellite imagery at a scale of 1:1 000 000 provided an overview of the Study Area. It showed clearly some of the more distinct visual characteristics of the overall landscape in general, and of the corridors in particular.

In view of the great areal extent of the Study Area, most of the base data were necessarily derived from aerial photographic interpretation. An Old Delft scanning stereoscope was used to determine unit boundaries from 1":80-chain vertical photographs, with parallel reference made to 1:100 000-scale topographic maps. Conflicts of detail were resolved with the aid of both 1:50 000-scale N.T.S. (National Topographic Survey) maps and oblique photographs taken during site overflights.

Extensive photographic coverage of the Study Area was obtained on 35-mm film, using colour slides. These films served to corroborate preliminary assessments of unit boundaries and features, to provide information on visual quality and visual vulnerability, and to permit sketching of sites for potential developments. A slide library has been established for the Study Area. A map which plots the location of slides is also available from the Terrestrial Studies Branch. These slides can be viewed within the Branch's offices, and duplicates can be provided at cost.

The physiographic region, terrain unit and forest zone interpretations were formulated with the assistance of members of the geology and vegetation staffs of the Terrestrial Studies Branch (while still the Resource Analysis Branch).

The visual unit information was consolidated on 1:100 000-scale topographic base maps which were compiled from reduced 1:50 000-scale N.T.S. maps; individual 1:50 000-scale maps cover too small an area to reveal the overall pattern of the visual units. The physiographic region and forest zone information was mapped at a scale of 1:250 000, and the terrain unit information was mapped at a scale of 1:50 000. This information was obtained from (former) Resource Analysis Branch staff and reproduced in this report at smaller scales. The original 1:250 000-scale forest zone map and the 1:50 000-scale terrain unit maps are available from the Assessment and Planning Division Library.

C VISUAL QUALITY RANKING SCORES

VISUAL QUALITY INDICATORS
ROCKY MOUNTAIN TRENCH

	SPATIAL DIMENSION & CHARACTER								WATER FORMS						DISTINCTIVE FEATURES & ACCENTS						
									EXTENT AND CHARACTER		SHORELINE FORM										
MAP REFERENCE UNIT NAME	SPATIAL VIVIDNESS	CROSS-SECTION COMPLEXITY	CROSS-SECTION PROPORTION INDEX	CROSS-SECTION CONTRAST	LINEARITY CONTINUITY	SKYLINE	PROFILE	FLOOR	LAKES	RIVERS STREAMS	LAKES	RIVERS STREAMS	WATER SETTING	SETTING FREQUENCY	FALLS AND RAPIDS	PEAKS, TOPOGRAPHIC ELEMENTS, GEOMORPHIC FEATURES	SNOW AND ICE	VEGETATION CONTRASTS	VISUAL UNIT LINKAGES	IMPACTS & DEGRADING CONTRASTS	RANKING SCORE
Fraser-McBride	10	4	10	4	10	4	4	4	1	4	1	4	4	4	1	2	1	4	4	2	82
McKale	4	4	10	2	2	4	2	4	1	4	1	2	2	2	4	4	2	10	4	4	72
Fleet	4	2	10	4	1	4	2	2	1	2	1	1	1	2	2	4	2	4	1	10	60
Humbug	4	2	4	4	4	4	2	2	1	2	1	2	2	4	2	4	1	4	2	4	55
East Twin	4	2	10	4	2	2	2	2	0	2	0	1	1	1	1	2	2	4	1	10	53

VISUAL QUALITY INDICATORS
McGREGOR PLATEAU

	SPATIAL DIMENSION & CHARACTER								WATER FORMS						DISTINCTIVE FEATURES & ACCENTS						
									EXTENT AND CHARACTER		SHORELINE FORM										
MAP REFERENCE UNIT NAME	SPATIAL VIVIDNESS	CROSS-SECTION COMPLEXITY	CROSS-SECTION PROPORTION INDEX	CROSS-SECTION CONTRAST	LINEARITY CONTINUITY	SKYLINE	PROFILE	FLOOR	LAKES	RIVERS STREAMS	LAKES	RIVERS STREAMS	WATER SETTING	SETTING FREQUENCY	FALLS AND RAPIDS	PEAKS, TOPOGRAPHIC ELEMENTS, GEOMORPHIC FEATURES	SNOW AND ICE	VEGETATION CONTRASTS	VISUAL UNIT LINKAGES	IMPACTS & DEGRADING CONTRASTS	RANKING SCORE
Herrick	10	10	10	4	10	4	10	2	2	10	2	4	4	10	10	10	10	10	4	10	146
McGregor River	10	10	10	10	10	2	4	2	2	10	2	10	4	10	1	1	2	4	4	1	109
Hedrick Creek	4	10	10	2	4	10	10	4	4	2	2	4	10	4	1	2	4	10	1	10	108
Gleason	4	10	10	2	2	4	2	0	2	2	10	4	10	4	0	4	10	10	1	10	101
Pass Lake	4	10	10	4	4	2	2	4	4	2	2	4	10	10	4	4	2	4	2	1	89
Torpy	10	10	10	4	10	2	4	4	1	2	2	4	4	4	0	1	2	4	2	1	81
McGregor Rapids	1	1	10	4	2	1	4	4	1	10	4	4	10	10	4	2	1	2	4	2	81
Dezaiko	4	10	4	2	2	4	2	1	2	2	4	2	4	4	0	10	2	10	1	10	80
Goodson	10	10	10	10	10	1	4	2	0	2	0	4	1	1	0	0	0	1	10	0	76
Severeid Creek	10	10	10	4	2	2	2	2	2	0	2	0	4	4	0	2	2	4	2	1	65
Upper Torpy	2	2	4	2	10	4	2	2	0	2	0	1	0	2	1	1	0	2	1	10	48

VISUAL QUALITY INDICATORS

ROCKY MOUNTAINS

MAP REFERENCE	SPATIAL DIMENSION & CHARACTER								WATER FORMS					DISTINCTIVE FEATURES & ACCENTS							
									EXTENT AND CHARACTER		SHORELINE FORM										
UNIT NAME	SPATIAL VIVIDNESS	CROSS-SECTION COMPLEXITY	CROSS-SECTION PROPORTION INDEX	CROSS-SECTION CONTRAST	LINEARITY CONTINUITY	SKYLINE	PROFILE	FLOOR	LAKES	RIVERS STREAMS	LAKES	RIVERS STREAMS	WATER SETTING	SETTING FREQUENCY	FALLS AND RAPIDS	PEAKS, TOPOGRAPHIC ELEMENTS, GEOMORPHIC FEATURES	SNOW AND ICE	VEGETATION CONTRASTS	VISUAL UNIT LINKAGES	IMPACTS & DEGRADING CONTRASTS	RANKING SCORE
Jarvis	10	10	10	10	10	10	10	10	10	10	10	4	10	10	10	10	10	10	10	10	194
Kakwa	10	10	10	10	4	10	10	10	10	4	10	4	10	10	4	10	10	4	10	4	164
Cecilia	10	10	10	10	10	4	10	10	10	2	4	4	10	10	2	10	4	10	10	10	160
Ovington	10	10	10	10	4	10	10	10	1	2	1	2	10	10	10	10	10	10	10	10	160
Kitchi	10	10	10	10	4	10	10	10	0	4	0	10	10	4	4	10	10	10	10	10	156
Middle McGregor	10	10	10	10	4	10	10	10	0	10	0	10	10	2	4	10	10	10	10	4	154
Narraway	10	4	10	4	4	4	10	10	10	10	4	4	4	10	10	10	10	10	10	2	150
Framstead	10	10	10	10	10	10	4	2	2	4	2	4	4	4	10	10	10	10	4	10	140
Warner	10	10	10	10	2	10	10	4	4	2	10	4	10	10	4	4	2	10	10	2	138
Paksumo	10	10	10	10	4	10	2	4	4	2	10	4	2	2	4	10	10	10	4	10	132
Upper Herrick	10	4	10	10	4	10	2	10	2	2	2	2	4	4	4	4	10	4	10	10	118
Edgegrain	10	10	10	10	4	10	4	4	1	2	2	2	2	4	2	10	10	2	4	10	113
Manitou	10	10	10	10	4	10	2	4	2	1	2	1	2	4	1	10	2	10	2	10	107
Obelisk	4	2	10	4	4	10	2	4	1	2	1	2	2	10	2	10	10	4	10	10	104
Cushing	10	10	10	10	10	10	4	2	1	2	0	1	1	2	1	4	1	10	4	10	103

VISUAL QUALITY INDICATORS

ROCKY MOUNTAINS

MAP REFERENCE	SPATIAL DIMENSION & CHARACTER								WATER FORMS					DISTINCTIVE FEATURES & ACCENTS							
									EXTENT AND CHARACTER		SHORELINE FORM										
UNIT NAME	SPATIAL VIVIDNESS	CROSS-SECTION COMPLEXITY	CROSS-SECTION PROPORTION INDEX	CROSS-SECTION CONTRAST	LINEARITY CONTINUITY	SKYLINE	PROFILE	FLOOR	LAKES	RIVERS STREAMS	LAKES	RIVERS STREAMS	WATER SETTING	SETTING FREQUENCY	FALLS AND RAPIDS	PEAKS, TOPOGRAPHIC ELEMENTS, GEOMORPHIC FEATURES	SNOW AND ICE	VEGETATION CONTRASTS	VISUAL UNIT LINKAGES	IMPACTS & DEGRADING CONTRASTS	RANKING SCORE
Renshaw	4	2	4	2	1	4	10	10	4	2	2	2	4	4	0	10	2	10	10	10	97
Upper Red Deer	4	2	10	4	4	4	2	2	2	4	4	2	4	10	10	2	10	4	10	2	96
Upper Belcourt	4	10	10	4	4	2	4	4	4	4	4	2	2	4	2	4	2	10	4	2	86
Moonias	10	4	10	4	4	10	2	2	2	0	2	1	2	2	0	10	4	4	2	10	85
Upper McGregor	4	4	10	4	10	4	2	2	0	4	0	2	2	4	10	1	4	1	4	10	82
South Muniok	4	4	10	4	10	4	2	2	2	2	1	2	4	4	4	4	1	4	1	10	79
Whatley	4	10	4	4	4	4	2	1	0	1	2	4	4	4	0	4	2	0	2	10	66
Walker	4	2	10	4	2	2	2	2	0	2	0	2	2	2	4	4	1	10	1	10	66
North Muinok	4	2	10	4	1	4	2	2	1	2	1	2	2	2	1	10	4	4	1	4	63
Buchanan	4	2	10	2	1	4	1	1	2	1	1	1	0	4	1	10	2	1	4	10	62
Wallop	4	4	10	10	2	4	2	2	0	2	0	2	1	1	1	2	1	4	0	10	62
Lower Morkill	4	2	10	4	4	2	1	0	0	4	0	2	2	2	2	1	0	1	2	10	53
Upper Morkill	4	2	10	2	4	2	2	1	0	2	0	2	2	2	1	1	1	1	1	10	50
Bastille	4	4	10	4	4	2	0	1	2	0	1	1	0	4	1	4	1	1	2	4	50
Hellroaring	4	2	10	2	4	2	2	1	0	1	0	1	0	1	1	1	1	1	1	10	45

VISUAL QUALITY INDICATORS

ROCKY MOUNTAINS

MAP REFERENCE	SPATIAL DIMENSION & CHARACTER								WATER FORMS					DISTINCTIVE FEATURES & ACCENTS							
UNIT NAME	SPATIAL VIVIDNESS	CROSS-SECTION COMPLEXITY	CROSS-SECTION PROPORTION INDEX	CROSS-SECTION CONTRAST	LINEARITY CONTINUITY	SKYLINE	PROFILE	FLOOR	EXTENT AND CHARACTER LAKES	EXTENT AND CHARACTER RIVERS STREAMS	SHORELINE FORM LAKES	SHORELINE FORM RIVERS STREAMS	WATER SETTING	SETTING FREQUENCY	FALLS AND RAPIDS	PEAKS, TOPOGRAPHIC ELEMENTS, GEOMORPHIC FEATURES	SNOW AND ICE	VEGETATION CONTRASTS	VISUAL UNIT LINKAGES	IMPACTS & DEGRADING CONTRASTS	RANKING SCORE
Forgetmenot	4	2	10	2	2	2	2	0	1	1	0	2	0	1	1	1	0	1	1	10	43
Idol	1	2	4	2	4	1	1	0	0	2	0	1	0	2	2	0	0	0	1	10	33
McCullagh	2	1	4	2	2	2	1	1	1	0	1	0	0	2	0	1	1	0	2	10	33

VISUAL QUALITY INDICATORS

ROCKY MOUNTAIN FOOTHILLS

MAP REFERENCE	SPATIAL DIMENSION & CHARACTER								WATER FORMS					DISTINCTIVE FEATURES & ACCENTS							
UNIT NAME	SPATIAL VIVIDNESS	CROSS-SECTION COMPLEXITY	CROSS-SECTION PROPORTION INDEX	CROSS-SECTION CONTRAST	LINEARITY CONTINUITY	SKYLINE	PROFILE	FLOOR	EXTENT AND CHARACTER LAKES	EXTENT AND CHARACTER RIVERS STREAMS	SHORELINE FORM LAKES	SHORELINE FORM RIVERS STREAMS	WATER SETTING	SETTING FREQUENCY	FALLS AND RAPIDS	PEAKS, TOPOGRAPHIC ELEMENTS, GEOMORPHIC FEATURES	SNOW AND ICE	VEGETATION CONTRASTS	VISUAL UNIT LINKAGES	IMPACTS & DEGRADING CONTRASTS	RANKING SCORE
Wapiti Gorge	10	4	4	4	1	4	10	1	1	10	0	10	10	4	2	2	0	2	10	4	93
Middle Belcourt	4	10	10	4	4	2	4	4	4	4	4	2	4	4	2	2	2	10	4	2	86
Mt. Becker	4	4	10	4	10	4	4	2	1	4	1	2	1	2	1	10	2	10	4	2	82
Middle Red Deer	4	4	10	4	4	2	4	4	1	4	1	1	1	2	4	4	2	4	10	4	74
Lower Red Deer	1	2	4	2	2	1	10	4	1	10	0	4	10	2	2	2	0	4	4	2	67
Lower Wapiti	4	2	2	2	2	1	4	1	1	2	0	10	10	4	1	2	0	2	4	4	58
Torrens	4	4	4	4	4	4	2	4	2	2	1	1	1	4	1	4	2	4	4	2	58
Porcupine	1	0	4	1	0	1	4	4	2	2	1	1	1	2	0	2	0	10	10	10	56
Huguenot	1	0	1	1	10	1	4	4	0	4	0	4	4	2	0	1	0	10	4	4	55
Calliou	0	0	1	0	0	1	10	4	4	2	10	2	2	4	0	1	0	10	0	4	55
Lower Belcourt	0	1	2	1	1	1	2	2	1	10	0	10	2	2	4	2	0	1	4	4	50
Lower Little Prairie	1	2	2	2	1	1	2	1	1	2	1	10	10	4	1	2	0	4	1	2	50
Esker	4	2	4	2	2	1	4	2	1	2	1	4	4	4	1	2	0	4	4	2	50
Saxon	2	4	4	2	1	2	2	2	0	2	0	4	4	4	2	4	0	4	4	2	49
Winfrey	4	4	4	2	2	2	2	2	0	2	0	2	2	1	0	1	1	4	2	10	47

VISUAL QUALITY INDICATORS

ROCKY MOUNTAIN FOOTHILLS

MAP REFERENCE	SPATIAL DIMENSION & CHARACTER								WATER FORMS					DISTINCTIVE FEATURES & ACCENTS							
UNIT NAME	SPATIAL VIVIDNESS	CROSS-SECTION COMPLEXITY	CROSS-SECTION PROPORTION INDEX	CROSS-SECTION CONTRAST	LINEARITY CONTINUITY	SKYLINE	PROFILE	FLOOR	EXTENT AND CHARACTER LAKES	EXTENT AND CHARACTER RIVERS STREAMS	SHORELINE FORM LAKES	SHORELINE FORM RIVERS STREAMS	WATER SETTING	SETTING FREQUENCY	FALLS AND RAPIDS	PEAKS, TOPOGRAPHIC ELEMENTS, GEOMORPHIC FEATURES	SNOW AND ICE	VEGETATION CONTRASTS	VISUAL UNIT LINKAGES	IMPACTS & DEGRADING CONTRASTS	RANKING SCORE
Upper Esker	4	4	4	4	4	2	4	1	1	1	0	1	2	2	0	0	0	1	4	2	41
Wapiti Ridge	2	2	2	1	2	1	2	2	2	1	4	2	2	4	0	2	0	4	2	4	41
Ptarmigan	4	4	2	4	2	1	1	2	0	1	0	2	1	1	0	1	2	10	1	2	41
Hanington	2	2	4	2	2	2	1	1	0	2	0	2	1	2	2	1	0	1	2	10	39
Holtslander	4	1	2	2	2	4	1	0	0	0	0	0	0	1	0	1	1	0	1	10	30
Boudoir	4	1	2	2	2	2	1	0	0	0	0	0	0	1	0	1	1	0	1	10	28
Upper Little Prairie	4	2	4	2	2	2	2	2	0	1	0	0	1	1	0	0	0	1	1	2	27
Flume	4	4	1	2	2	1	0	0	0	1	0	1	0	1	0	0	0	1	1	4	23

VISUAL QUALITY INDICATORS

ALBERTA PLATEAU BENCHLANDS

MAP REFERENCE UNIT NAME	SPATIAL DIMENSION & CHARACTER								WATER FORMS						DISTINCTIVE FEATURES & ACCENTS						
	SPATIAL TYPOLOGY	CROSS-SECTION COMPLEXITY	CROSS-SECTION PROPORTION INDEX	CROSS-SECTION CONTRAST	LINEARITY CONTINUITY	SKYLINE	PROFILE	FLOOR	EXTENT AND CHARACTER: LAKES	EXTENT AND CHARACTER: RIVERS STREAMS	SHORELINE FORM: LAKES	SHORELINE FORM: RIVERS STREAMS	WATER SETTING	SETTING FREQUENCY	FALLS AND RAPIDS	PEAKS, TOPOGRAPHIC ELEMENTS, GEOMORPHIC FEATURES	SNOW AND ICE	VEGETATION CONTRASTS	VISUAL UNIT LINKAGES	IMPACTS & DEGRADING CONTRASTS	RANKING SCORE
Old Wives	4	2	2	2	4	0	4	1	0	4	0	4	10	1	0	2	0	4	4	4	52
Mistanusk	0	1	2	1	1	1	1	1	1	2	0	2	2	4	0	2	0	4	0	4	29
Red Willow	0	0	1	0	0	1	0	2	1	0	1	1	0	4	0	0	0	10	0	4	25

D VISUAL INTERPRETATIONS FOR VEGETATION UNITS

The vegetation units which form the framework for the visual interpretations in Table D.1. are derived from present ecological condition mapping at a scale of 1:50 000. Visual interpretations have been prepared only for those units which are considered by the vegetation staff of the Terrestrial Studies Branch to be ecologically sensitive. Either the vegetation cover in such units is inherently sensitive, or is indicative of generally sensitive environmental conditions (such as excessive moisture or soil instability). For a further discussion, consult ELUSC (1978, Appendix F, sections F.1.2. and F.1.6.).

TABLE D.1.

VISUAL INTERPRETATIONS FOR VEGETATION UNITS

UNIT SYMBOL	VEGETATION DESCRIPTION	VISUAL INTERPRETATION
A1	- dry open grasslands - occur on shallow, colluvial soils, usually on south-facing slopes - susceptible to erosion - rare within the Study Area	- view sites present - vulnerable to visual impacts due to the visibility of the land surface - routes which follow contours will minimize cut and fill requirements and conform to the highly visible form of the landscape
A2	- seral stands of trembling aspen - occur on fine-to-medium-textured parent materials, usually lacustrine - soil is easily erodible following the removal of plant cover - often found in gullies - soils liquefact when wet	- route alignments through gullied areas will create a horizontal band of cut-and-fill slopes - these slopes will be highly visible due to the contrast in the colour of the soil with that of the forest cover - the visual impact will likely be sustained over a long period of time, due to the inability of vegetation to colonize the continuously-eroding soils
A3	- dense cover of slide alder (bright green) - occurs where establishment of a regular coniferous forest has been prevented by avalanche activity - seepage is usually present and soils are unstable	- bright green avalanche chutes provide variety in an otherwise uniform forest cover - visual impacts will be associated with the contrast between horizontal route alignments and the vertical vegetation patterns
B1	- organic wetlands with some degree of tree cover, although usually sparse to open - tree species include black spruce, tamarack and/or lodgepole pine	- alignments should avoid these units (particularly small isolated units), where possible, since route development would dominate the small-scale vegetation patterns, tending to obscure one's perception of them
B2	- undifferentiated wetland communities on organic materials - usually consist of bogs or fens which may be quite variable floristically	- as above, B1

TABLE D.1. (continued)

B3	- shallow-water communities dominated by herbs - water table is above the soil surface for most of the year - plant communities contain several species which serve as sources of food for waterfowl	- minimize site disburbance adjacent to alignments - alignments lying tangential to these areas may take advantage of the sparse vegetation cover to create views of the subtle patterns of vegetation distribution and the associated wildlife
C1	- herbaceous meadows which have developed on fluvial deposits - tree regeneration is inhibited by the herbaceous plant cover - this ecological condition is often attributable to horse-grazing pressures - rare within the Study Area	- these meadows, which usually occur adjacent to rivers, provide visual interest in an otherwise forested landscape - openings create good viewing opportunities
C2	- occurs in the krummholz subzone of the Subalpine Engelmann spruce - alpine fir zone - characterized by patches of stunted tree vegetation in an open, park-like setting	- open vegetation permits excellent views of the area itself, and of both the adjacent and distant landscapes - minimize site disturbance since plant regeneration is very slow
C3	- diverse herbaceous meadowlands in subalpine areas - tree growth is inhibited by excessive moisture	- as above, C2
D1	- edaphic climax shrub communities which are dominated by willows - occur on fluvial deposits such as sand or gravel bars, and are periodically subject to flooding	- destruction of vegetation at river crossings should be minimized
D2	- forested communities which are found on existing floodplains - subject to periodic flooding - presence of black cottonwood suggests that flooding is fairly frequent - contains important browse species for ungulates	- locate route alignments along the edges of natural vegetation openings to permit viewing
D3	- contains mature edaphic climax of white spruce - flooding frequency less than in D2 units, although the water table is sufficiently near the surface to maintain moist-to-wet moisture regimes	- as above, D2
E1	- situated in alpine or subalpine areas where plant growth is restricted by both edaphic and climatic conditions	- subtle patterns in weathered rock formations are easily obscured by development - align routes along contours to minimize cut and fill - minimize site disturbance since regeneration is very slow
E2	- dry south-facing sites with shallow soils - tree growth is retarded and difficult to initiate - uncommon in the Study Area	- as above, E1

E GLOSSARY

Of the definitions which are presented below, those which are related to visual analysis have been adapted from current visual management literature.

AESTHETICS

The science of philosophy concerned with the quality or sensory experience (in this case, limited to visual experience). A branch of philosophy dealing with the nature of the beautiful, and with judgements concerning beauty. It is also viewed as a body of knowledge about those characteristics of objects which make them pleasing or displeasing to the senses, and those characteristics of human perception which affect sensation. The quality of being "aesthetic" is not the opposite of the qualities of "practicality" or "reality", but rather another aspect or way of experiencing the same real-world phenomena. Thus, blue skies, uncontaminated water and uncluttered urban landscapes all have aesthetic value, because they imply health, pleasure and security.

ADVECTIVE FROST

A frost which is caused by the influx of a mass of cold air. High windspeeds may be associated with the air movement. The temperature throughout the vertical extent of the air may be considerably below freezing point.

BIOPHYSICAL LAND CLASSIFICATION

This expression refers to the Assessment and Planning Division's overall land classification system for describing and mapping climate, terrain, soils, vegetation, aquatic resources, wildlife resources, outdoor recreation resources and visual resources. This approach to land description is currently in the formative stages. While each component sector has made progress in developing a component classification methodology, much work remains to be done to integrate the individual classification systems into an overall biophysical method of land evaluation.

CLIMAX VEGETATION

A stable community of plants which has resulted from the successive replacement of plant species and which is now in harmony with other environmental conditions at a site (such as climate, slope, soil, fauna, etc.). Plant species which occur in climax vegetation communities are termed climax species. Two categories of climax vegetation are recognized for the purposes of this report: (i) climatic climax vegetation, within which normal successional vegetation patterns are completed and the vegetation is a reflection of regional macroclimate; and (ii) edaphic climax vegetation, which develops as a response to strong local site influences, such as very dry aspect, or a high water table, these local site influences overriding regional macroclimatic influences.

DISTANCE ZONES

Three conventional terms in painting - foreground, middle-ground and background - are helpful in describing distance relationships.

Foreground (zero to one-half mile): That area which can be designated with a clarity and simplicity which is not possible in the middleground and background, since only in the foreground is the observer a direct participant. He can obtain impressions of immediate details such as bark pattern, boulder forms, or degraded features. This zone is important because it sets a tone of quality. Intensity of colour is at a maximum level, since the effect of colour diminution due to atmospheric scattering of light rays is minimal.

Middleground (one-half to three-to-five miles): A critical area for two reasons. Firstly, this is the zone where components of the landscape may be perceived as joining together, such as where hills become a range or trees make a forest. Secondly, this is the zone where man-made changes may be most obviously revealed as either blending harmoniously within the landscape or imposing incongruities of form, line, colour, shape or scale. Colours are unmistakable, but are bluer and softer than those of the foreground. Some of the sharpness of value contrasts is reduced.

Background (three-to-five miles to infinite distance): Surfaces of landforms lack detail distinctions. Silhouettes and ridges of one land mass against another are the conspicuous visual components of the background, with skyline the strongest line of all.

EDAPHIC

A descriptive term which, depending on context, may indicate: (i) soil-related factors only; or (ii) a broader range of local factors (including not only soil but also topography, microclimate and vegetation). The second usage is usually employed when local (edaphic or intrazonal) factors are being compared to regional (zonal or macroclimatic) factors (see "climax vegetation").

FAULT

A distinct fracture or zone of fracture within the earth's crust along which there has been relative displacement of the rocks on either side. Displacement distances may vary from virtually nil to many miles.

IMAGEABILITY

That quality in a physical object which has a high probability of evoking a strong image for any given observer. It is that quality (shape, colour, or arrangement) which provides a strongly identified, highly useful mental image of the environment.

KRUMMHOLZ

An area of sporadically-distributed tree cover, the tree species being subalpine, and the trees themselves being stunted in varying degrees. Tree clumps are often interspersed with alpine-tundra-like openings, or with other types of vegetation dominated by herbs and/or shrubs.

LACUSTRINE DEPOSITS

Materials which have accumulated: (i) either by settling from suspension in bodies of standing fresh water; or (ii) through wave action at the margins of such water bodies. Typically fine-grained and of uniform particle size.

LANDSCAPE

Land form and land cover which collectively form a distinct visual pattern. Land form (as distinct from the geological term "landform") consists of the three-dimensional morphology of the land surface. Land cover comprises water, vegetation and man-made developments, including cities.

PHYSIOGRAPHIC REGION

A tract of land of similar geological structure and climate which has experienced a unified physical (geomorphological) history.

PORTAL

Visual units are seldom completely enclosed. It is common to find at least one or two openings (or portals) where the skyline dips to provide a threshold for drainage, access and views outward. Portals are important for observer orientation and for potential movement into, or through, a unit.

VISTA

A directional view towards a visual feature, the view being channelled or framed by closer elements.

VISUAL ELEMENT

A discrete part of the total landscape, perceptible in form, scale, line, colour, and texture. Visual elements are identifiable and separable from background or surroundings, and are stable and tangible in contrast to shadows, reflections, clouds, waves, and other ephemeral effects.

VISUAL IMPACT

A contrasting intrusion in the unified order of landscape, seen and appreciated as a misfit in appearance or function. A visual impact contributes to a reduction in scenic values.

VISUAL PATTERN ELEMENTS

Form, line, colour and texture, as defined below.
Form: The mass or shape of an object. The strongest of the four basic elements of visual pattern.
Line: Geometrically, a point which has been extended, or the intersection of two planes, e.g., a silhouette, or a boundary between patterns in the landscape. The second strongest of the four basic visual pattern elements.
Colour: The third strongest of the four basic elements of visual pattern; the hue (e.g. red or blue) and value (e.g. light or dark) of the light reflected or emitted by an object.
Texture: The visual or tactile surface characteristics of various elements in the landscape; often the least dominant of the four visual pattern elements.

(VISUAL) PERCEPTION

The process of visually identifying and distinguishing objects from within their settings.

VISUAL RESOURCES

The sum total of the features which make up the visible landscape. Includes the land, water, vegetative, animal, and other features which are visible in the landscape.

VISUAL VULNERABILITY

Visual vulnerability is a measure of the degree to which a given landscape is capable of absorbing man's impacts without significant modification of its positive visual qualities. High vulnerability indicates that natural conditions are easily disturbed, and that such disturbance would be highly visible in the event of development; low vulnerability conditions permit development to be absorbed with less evident alteration to the landscape. Generally, areas with steep slopes and uniform surface patterns are assigned high vulnerability ratings, while areas with gentle slopes and varied surface patterns are assigned low vulnerability ratings.

VULNERABILITY SECTOR

A land surface which is homogeneous with respect to its visual vulnerability rating.

SELECTED LIST OF BULLETINS

A BULLETIN is one of four Regular Publication series produced by the Assessment and Planning Division. (This series replaces the former Resource Analysis Branch series). Bulletins present the results of technical or scientific studies including the interpretation or application of resource data.

APD BULLETIN 3 - Regional Hydrology of the Northeast Coal Study Area. Michael J. Miles.

APD BULLETIN 23 - Visual Resources of the Northeast Coal Study Area 1977-1978. R. Horner.

RAB BULLETIN 4 - Outdoor Recreation Resources of the Northeast Coal Study Area 1976-1977. H.J. Block.

RAB BULLETIN 5 - Visual Resources of the Northeast Coal Study Area 1976-1977. R.J. Tetlow and S.R.J. Sheppard.

RAB BULLETIN 6 - Wildlife Resources of the Northeast Coal Study Area 1976-1977. G. Smith.

RAB BULLETIN 7 - Biophysical Soil Resources and Land Evaluation of the Northeast Coal Study Area 1976-1977 Volumes 1 and 2. T. Vold.

RAB BULLETIN 8 - Vegetation Resources of the Northeast Coal Study Area 1976-1977. A.P. Harcombe.

RAB BULLETIN 9 - Aquatic Migratory Bird Resources of the Northeast Coal Study Area. N.S. Trenholme.

RAB BULLETIN 10 - Aquatic System Units of the Northeast Coal Study Area. E.A. Harding.

RAB BULLETIN 11 - Northeast Coal Study Area 1977-1978: A List of Vascular Plant Species. A. Ceska.

RAB BULLETIN 12 - Wildlife Resources of the Northeast Coal Study Area 1977-1978. G. Smith.

RAB BULLETIN 13 - Outdoor Recreation Resources of the Northeast Coal Study Area 1977-1978. K. Sky.

RAB BULLETIN 17 - Aquatic Inventory and Analysis in the Vicinity of the Proposed Tumbler Ridge Townsite. M.J. Miles, E.A. Harding.